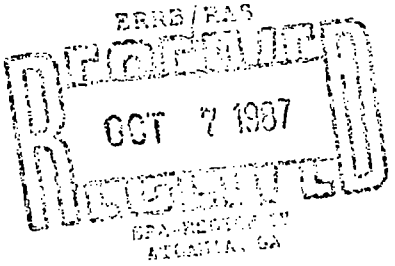
3 4 00137



FINAL REPORT
BLUFF ROAD SITE
REMEDIAL INVESTIGATION
HEALTH AND SAFETY PLAN

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
Washington, D.C. 20460

Work Assignment No.	:	353
EPA Region	:	IV
Site No.	:	4B15
Contract No.	:	68-01-7331
CDM Federal Programs Corporation Document No.	:	T353-CO4-FR-BBDH-2
Prepared By	:	Versar Inc.
Work Assignment Project Manager	:	Ken Barry
Telephone Number	:	(404) 873-2137
Primary Contact	:	Michelle Glenn
Telephone Number	:	(404) 347-2643
Date Prepared	:	September 30, 1987

TAI5-36

TABLE OF CONTENTS

Page

TABLES

FIGURES

1.0 INTRODUCTION

This document presents the health and safety program to be implemented by the assigned subcontractor during the conduct of the remedial investigation (RI) at the Bluff Road Site. The purpose of the health and safety program is to protect the health and safety of the work force, oversight personnel, and the general public during the RI activities. All activities will be performed in accordance with the Occupational Safety and Health Administration (OSHA) standards (Title 29 CFR 1910 and 1926) and in accordance with applicable federal, state, and local regulations. Activities are expected to encompass sampling of ground water, soil, sediment, surface water, and installation of additional ground-water monitoring wells. The investigation will be performed onsite (inside the fenced area) and in the area adjacent to the Bluff Road Site.

The designated site health and safety officer will ensure that all site personnel initially adhere to the health and safety procedures before granting them site access. If at any time personnel fail to adhere to health and safety procedures, they will face disciplinary action including immediate and permanent dismissal from the job site.

1.1 Health and Safety Program Objectives

It is the objective of this health and safety plan to establish a means to provide a safe work environment for site personnel, to provide a uniform and concise policy of action, and to provide all site personnel with the necessary guidance to adhere to these policies. The organization of this program and the procedures contained herein have been based on an evaluation of potential hazards at the site, and designation of recognized standard procedures in response to these hazards.

1.2 Site Health and Safety Personnel and Responsibilities

The design and implementation of the health and safety program is accomplished through an integrated team effort. The subcontractor will designate key individuals as members of the team. Their designated responsibilities are as follows:

Site Manager

- Overall responsibility for performance of the site investigation.
- Scheduling and chairing daily safety briefing and debriefing meetings.
- Defining daily work objectives.
- Enforcement of safety program.
- Informing contractor of personal injuries, exposures, or environmental releases.

Head of Monitoring and Site Services

- Overseeing monitoring activities and preparing daily progress summaries.
- Scheduling and assigning of monitoring and support personnel.
- Maintaining daily meteorological records obtained from the nearest National Weather Service Station.
- Maintaining safety instrumentation.
- Liaison between site and analytical laboratory.
- General site services support.
- Enforcement of safety program.

Site Health and Safety Officer

- Establishing and maintaining site security.
- Personnel training.

- o Issuing site identification and clearance badges.
- o Securing, issuing, and maintaining safety equipment supplies.
- o Establishing and operating exclusion and contamination reduction areas.
- o Completing and maintaining incident report forms.
- o Communicating safety status to site personnel.
- o Liaison with local police, fire, and other emergency personnel.
- o Enforcement of safety program.

Field Supervisor

- o Overall responsibility for all subcontractor activities.
- o Alternate chairman of briefing and debriefing meetings.
- o Enforcement of safety program.

Subcontractor Health and Safety Officer

- o Offsite (home office) corporate support for integrating the health and safety program with field operations.

1.3 Personnel Selection

Personnel selected to participate in this investigation will have received appropriate training, be under an active medical surveillance program, and have demonstrated their maturity and responsibility in performing required tasks in potentially hazardous environments.

All personnel and visitors entering the site will be required to read this safety plan and sign a certificate (Figure 1) stating that they have read and understand this safety plan.

1.3.1 Training

In accordance with OSHA regulations, personnel who have site clearance will have received a minimum of 40 hours of classroom instruction in the fundamentals of workplace safety and a minimum of 3 days of actual field experience under the direct supervision of a trained

I certify that I have read and understand the Health and Safety Plan for the Bluff Road Remedial Investigation.

NAME	DATE

Figure 1. Health and Safety Certification

and experienced supervisor. This training has generally addressed the following topics of instruction:

- o Safety Orientation;
- o Work Organization, Zones and Control;
- o Chemical and Physical Hazards;
- o Respirator Protection;
- o Protective Clothing;
- o Decontamination Procedures;
- o Ambient Air Quality Monitoring;
- o Sampling of Hazardous Materials;
- o Safety Planning;
- o Basic First Aid and Cardiopulmonary Resuscitation (CPR);
- o Emergency Response; and
- o Electrical Hazards.

1.3.2 Medical Surveillance

All personnel with site clearance will, in addition to training, be under an occupation medical program meeting Federal requirements. The assigned subcontractor will have an approved medical monitoring program in operation.

1.4 Hazard Evaluation

A hazard evaluation has been conducted to ensure that site activities, personnel protection, and emergency response procedures are consistent with the specific contaminants expected to be encountered. The

hazard evaluation was performed by Versar based on data obtained from the EPA Region IV office. While the assigned subcontractor may use this hazard evaluation, neither Versar, CDM/FPC, nor the USEPA accept any liability for its completeness or lack thereof

The contaminants of concern at the Bluff Road Site are volatile organic compounds such as benzene, methylene chloride, 1,1,1-trichloroethane, chloroform, and toluene. Inorganic constituents including zinc, copper, chromium, magnesium, nickel, and arsenic are also present in different matrices in the contaminated area.

The sludge in the aboveground tank has exhibited concentrations of 2-chlorophenol as high as 33,300 ppm (Golder Associates, 1986). Concentration of organic vapors leaving the tank has been measured in the past at 50-60 ppm (Golder Associates, 1985). Although the tank contents are a health concern, no activities are planned around the tank. The area around the tank will be delineated as off limits to all personnel.

Table 1 provides maximum concentrations of compounds detected at the Bluff Road Site.

Table 2 illustrates pertinent toxicological data for the compounds that have been detected in past analysis. For all compounds, the primary working exposure concerns are inhalation (of dust for nonvolatile compounds and of vapor for volatile compounds) and skin contact/absorption.

By far, the predominant compounds are the volatile organic compounds listed in Table 1. Odor thresholds are listed in Table 1; odor characteristics for the volatile organic compounds follow:

- Chlorobenzene - sweet, almond odor.
- Trichloroethylene - sweet odor.
- Chloroform - pleasant, sweet odor.
- Methylene chloride - pleasant, sweet odor.
- 1,1,1-trichloroethane - mild, chloroform-like odor.
- Ethylbenzene - sweet, gasoline-like odor.
- Toluene - pleasant odor, benzene-like.
- Benzene - aromatic odor.

TABLE 1

Maximum Contaminant Concentrations

Organics	Matrix	Concentration (ppm)
Trichloroethylene	S	0.11
	W	5.28
Methylene Chloride	S	4.29
	W	10.0
1,1,1-Trichloroethane	S	1.68
	W	30.6
Chlorform	S	0.37
	W	3.79
Toluene	S	1.08
	W	2.41
Inorganics		
Zinc	B	9.4
	D	23.0
Copper	B	3.8
	D	7.6
Chromium	B	5.0
	D	13.0
Arsenic	B	19.8
Magnesium	B	170.0
	D	480.0
Nickel	B	17.0
	D	39.0

S= Soil
W= Groundwater
D= Drainage Ditch Sediment
B= Lagoon Sediment

TABLE 2
TOXICOLOGICAL DATA FOR COMPOUNDS PREDOMINANT IN PAST ANALYSES

ompound	Matrix Found	IP[a]	PEL[b]	TLV[b]	Odor Threshold[b] (ppm)	IDLH[b] (ppm)
		Volative Organic Compounds				
Chlorobenzene	S	9.07	75	75	0.21	2400
richloroethylene	S/W	9.47	100	50	50	1000 Ca
ethylene Chloride	S/W	11.35	500	100	307	5000
1,1,1-Trichloroethane	S/W	---	350	---	400	1000 Ca
hloroform	S/W	11.42	50[c]	10	200	1000 Ca
thylbenzene	S	8.76	100	---	140	2000
Toluene	S/W	8.82	200	100	0.17	2000 Ca
enzene	S	9.25	10	10	31	2000 Ca
		Inorganic Compounds (mg/m^3)				
inc	B/D	---	5[c]	10[c]	---	---
Copper	B/D	---	1	---	---	---
hromium	B/D	---	0.5	---	---	250 mg/m^3
rsenic	B	---	0.01	0.2	---	Ca
Magnesium	B/D	---	15[d]	10[d]	---	---
ickel	B/D	---	1	1	---	Ca

ote: Material referenced from NIOSH pocket guide to Chemical Hazards and Chemtox.

[a]Ionization potential (eV)
PEL (ppm) = Permissible Exposure Limit. Occupational Safety and Health Administration (OSHA) in 1983 set 8-hour time weighted average concentrations allowable in any 8-hour work shift of a 40-hour work week which shall not be exceeded for exposure to airborne contaminants. Inorganics reported as mg/m^3.
TLV (ppm) = Threshold Limit Value. Estimate at average safe toxicant concentration that can be tolerated on a regular basis. Inorganics reported mg/m^3.
Oxide form
Oxide fume

= Lagoon sediment
reated as a carcinogen to man
rainage Ditch Sediment
S = Contaminants in soil
= Contaminants in water

A partial list of compounds that were known to have been leaking from containers prior to the partial cleanup in 1982 and 1983 are listed below.

- Hexadiamine
- Teramine
- Sodium biosulfate
- Naphthalic acid
- Ethylene glycol
- Potassium methylate
- Trichloroethane
- Carbon tetrachloride
- Acetone
- Pyridine
- Iodine
- Sodium sulphydrate
- Diethyl glycol

At the time of the containers' removal from the site, contaminated soil was also excavated and filled in with clean gravel.

Chlorobenzene and toluene have odor thresholds less than permissible exposure levels. Consequently, these compounds can be detected by smell below levels which may cause adverse health effects.

Explosion or fire hazards are not expected at this site. Some of the compounds found in soil analysis are flammable in the liquid and vapor stage (i.e., toluene, benzene, chlorobenzene, and ethylbenzene); but, conditions at the site do not appear to pose an explosive threat.

For the volatile compounds, the following acute symptoms may result after exposure to elevated levels:

- Chlorobenzene - irritating to eyes, skin, and mucous membranes.
- Trichloroethylene - headache, vertigo, vision distortion, tremors, nausea, vomiting, irritation of nose and throat.
- Methylene chloride - anesthetic effects, nausea, skin and eye irritant upon contact.
- 1,1,1-trichloroethane - irritating to nose and eyes, central nervous system depression, narcotic in high concentrations.
- Chloroform - headache, nausea, dizziness, narcosis, anorexia.

- o Toluene - fainting, weakness, confusion, euphoria, dizziness.
- o Benzene - irritating to eyes, nose, and respiratory system, giddiness, headache, and staggered gait.

Detailed chemical fact sheets for these compounds are provided in Attachment 1 and will be throughly reviewed by all site personnel.

2.0 SITE DESCRIPTION

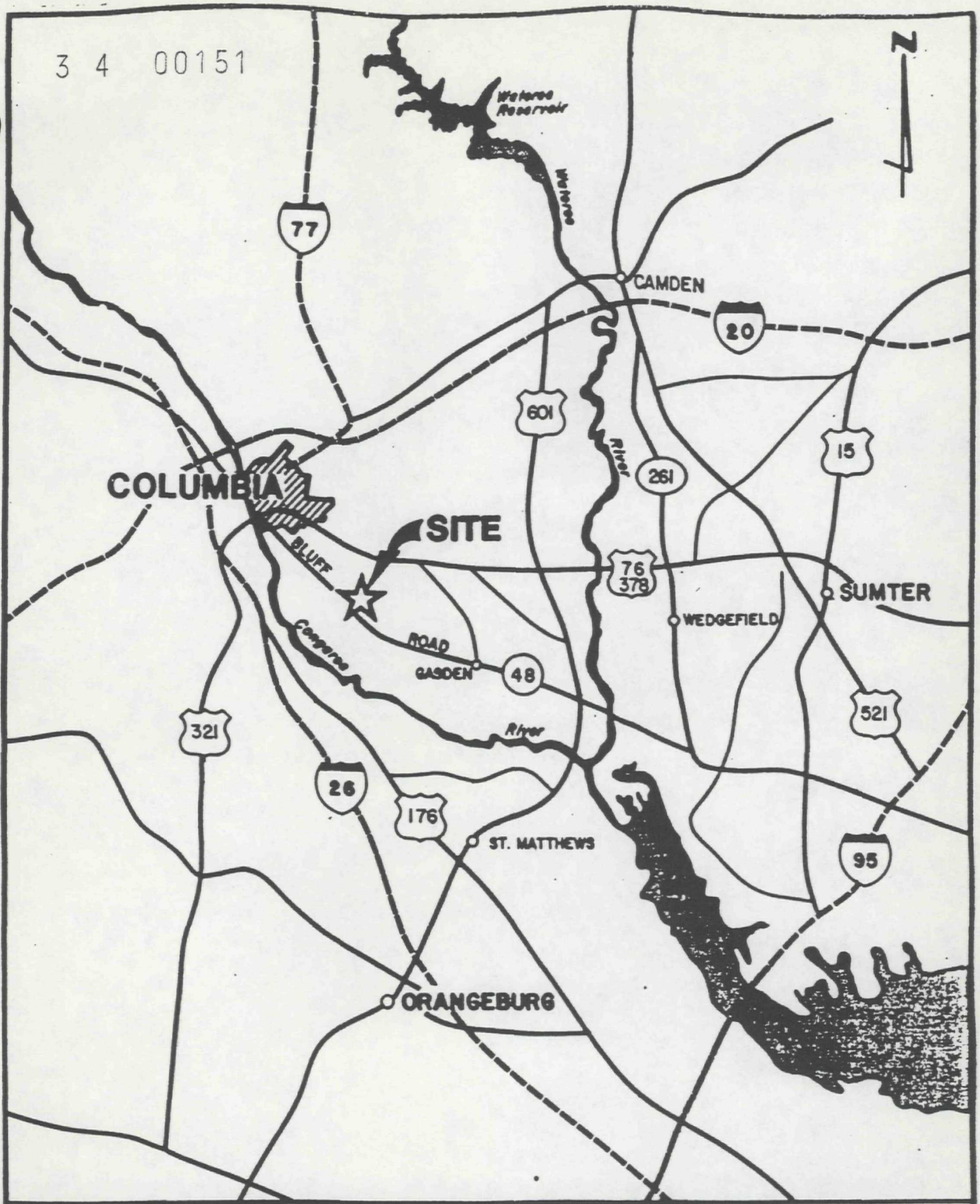
The Bluff Road site in Richland County, South Carolina, is approximately 10 miles southeast of Columbia, South Carolina (Figure 2). The area around the 2-acre site, from Bluff Road to Myers Creek at South Carolina State Road 77, is a wooded, slightly swampy area. An intermittent stream is continuous from the Bluff Road site to Myers Creek. The upper end of the intermittent stream has drainage ruts radiating from it. Apparently, the ruts were installed many years ago to help drain the area for logging.

Directly across State Highway 48 (Bluff Road) from the Bluff Road site is the main entrance to the Westinghouse Nuclear Fuel Plant, whose buildings are located 1/4 mile from the highway. The company assembles fuel rods for nuclear power plants.

As shown in Figure 3, the site is characterized by a central metal-walled building. Two small ponds located at the northern end of the site are remnants of the lime slurry disposal ponds used by the acetylene manufacturer that once occupied the property. The western pond contains dried lime and is usually dry; the eastern pond usually holds water at a depth of about 30 centimeters (cm). An old aboveground storage tank still exists and contains high levels of phenolic compounds. The old storage area is surrounded by a chain-linked fence. There is no telephone or electricity onsite at present but power and telephone lines run nearby so they can be hooked up.

2.1 Site History

The site was operated by South Carolina Recycling and Disposal, Inc. (SCR&D) as a storage, recycling, and disposal facility for waste chemicals from 1976 to 1982. A site visit in March 1980 by the United States Environmental Protection Agency (EPA) revealed leaking containers of volatile organic compounds. Chemicals were reportedly observed leaking from the drums into drainage ditches and the onsite surface lagoon. Analysis by the EPA, of drainage ditch sediments indicated the



JOB NO. 853-3079	SCALE N.T.S	SITE LOCATION MAP
DRAWN T.s.R.	DATE 1/22/86	
CHECKED MTF	DWG. NO. 15	
FROM GOLDER ASSOCIATES, 1986	SCDHEC/BLUFF RD./S.C.	FIGURE 1

FIGURE 2
BLUFF ROAD SITE

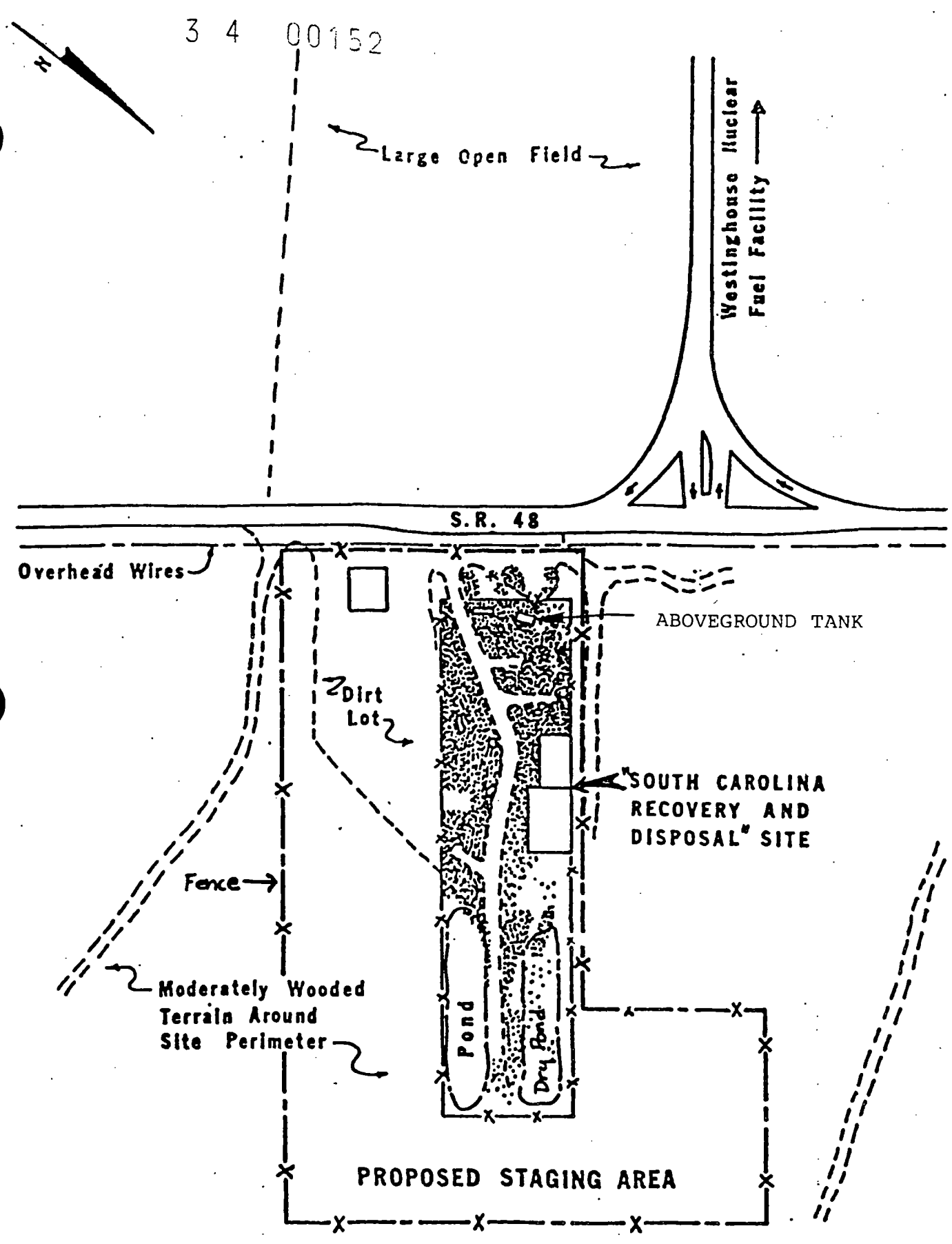


FIGURE 3
SITE LAYOUT

(source: U.S. EPA, 1982)

Not To Scale

presence of organic compounds, halogenated organics, pesticides, and metals.

A ground-water investigation was performed by the South Carolina Department of Health and Environmental Control (SCDHEC) in the fall of 1980. Ground-water samples revealed elevated levels of chlorinated organic solvents and lead. Resampling in August 1982 indicated that concentrations of organic compounds in the ground water were increasing (SCDHEC, 1981).

Preliminary cleanup of the site was performed in 1982 and 1983, partly under the Comprehensive Environmental Response Compensation Liability Act (CERCLA). Drums of chemicals and contaminated soil were removed and many areas were covered with gravel to provide clean roads. The onsite lagoon, material adjacent to the lagoon identified as lime, and a large aboveground tank remained onsite. Some reports indicate that an underground tank also remains onsite, however, this is not certain. An area in the rear of the site was cleared and used for detonation of shock-sensitive materials during the site cleanup. This area is referred to as the demolition area (Golder Associates, 1986). The location of the detonation area was not depicted on the site maps in the RI report.

Golder Associates was employed by SCDHEC to conduct a Remedial Investigation (RI) to determine the type, extent, and degree of soil and ground-water contamination on and around the site. In 1985, soil, lagoon water and sediment, sludge from the aboveground tank, and ground-water samples were collected for chemical analysis.

Analysis of a composite soil sample for priority pollutant compounds detected primarily volatile organics and some metals. The water samples from the lagoon revealed no priority pollutant organic compounds, but some metals were present. Sediment from the lagoon samples showed the presence

of some metals contamination and slight organic concentrations. Sludge samples from the aboveground tank onsite had high concentrations of phenolic compounds. The ground-water analysis revealed nine primary volatile organic pollutants. Analysis samples of surface water from various runoff points around the site have shown inconclusive results.

3.0 SITE MANAGEMENT

As part of the overall site investigation activities, the subcontractor will implement and continually administer the following systems, policies, and procedures that will reasonably ensure the health and safety of onsite personnel, official site visitors, as well as the public in general.

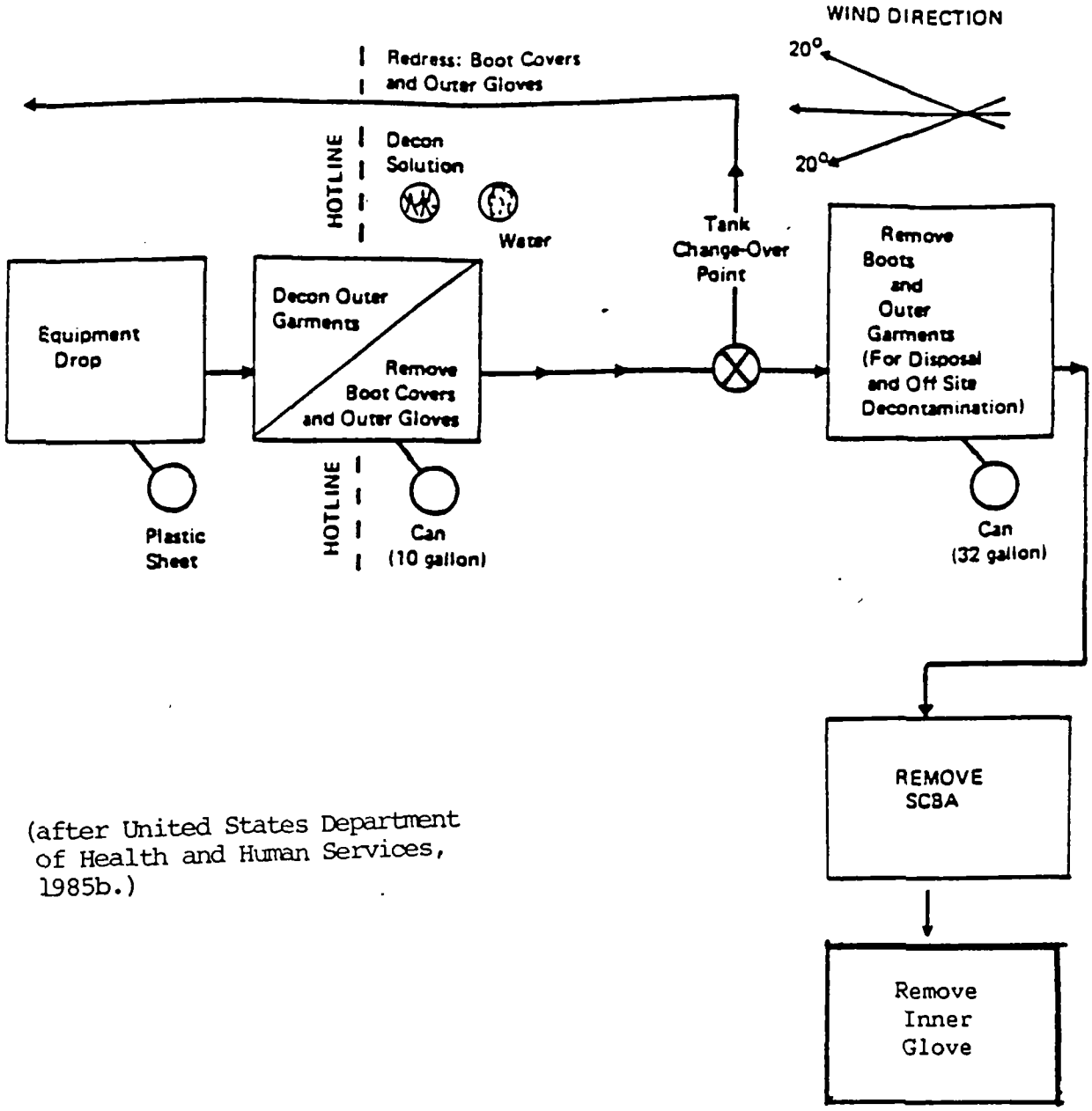
3.1 Contamination Reduction Corridors

The subcontractor will establish a contamination reduction corridor (CRC) in accordance with OSHA regulations (29 CFR Part 1910) for work being done on and around the site.

3.1.1 Work Area Specifications and Procedures

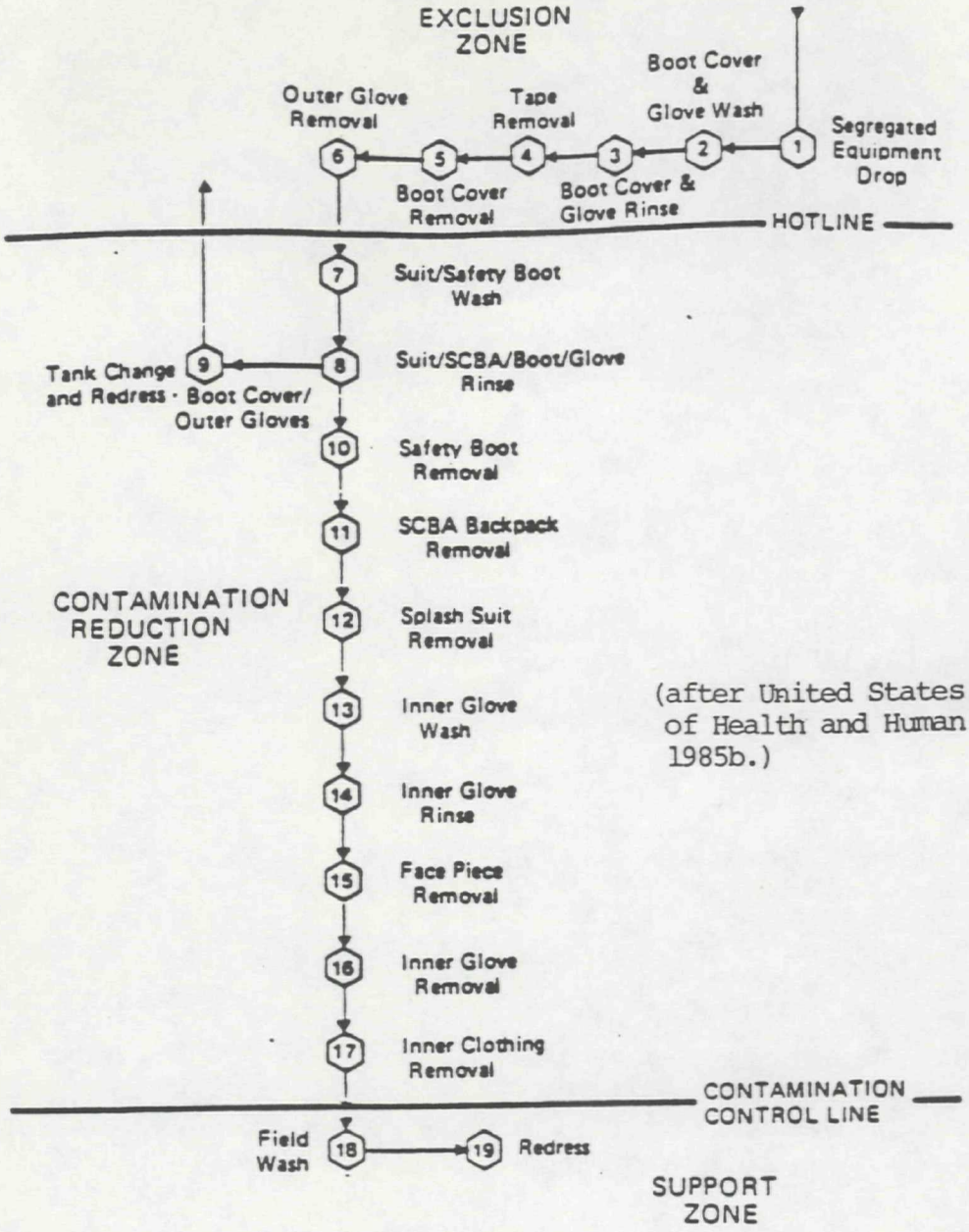
Three zones will be established and physically delineated on the site. The zone(s) of exclusion (more than a single exclusion zone may be necessary) will encompass areas known to have stored containerized chemicals and those locations designated to require drilling activities in the immediate vicinity of the storage area. Access to each exclusion zone will be through a CRC. Separate CRCs will be established for personnel and heavy equipment.

The CRC will consist of discrete stations to systematically reduce the levels of potential contamination. Maximum and minimum decontamination guidelines are laid out and defined in Figures 4 through 7. Each station will be established, clearly marked, maintained, and specific station instructions will be posted. The CRC will have a ceiling constructed of wooden framing, covered with a roof skin of 6 millimeter plastic sheeting, and no walls to generally protect workers from adverse weather conditions. The support zone will be defined as uncontaminated areas outside the CRC and exclusion zone.



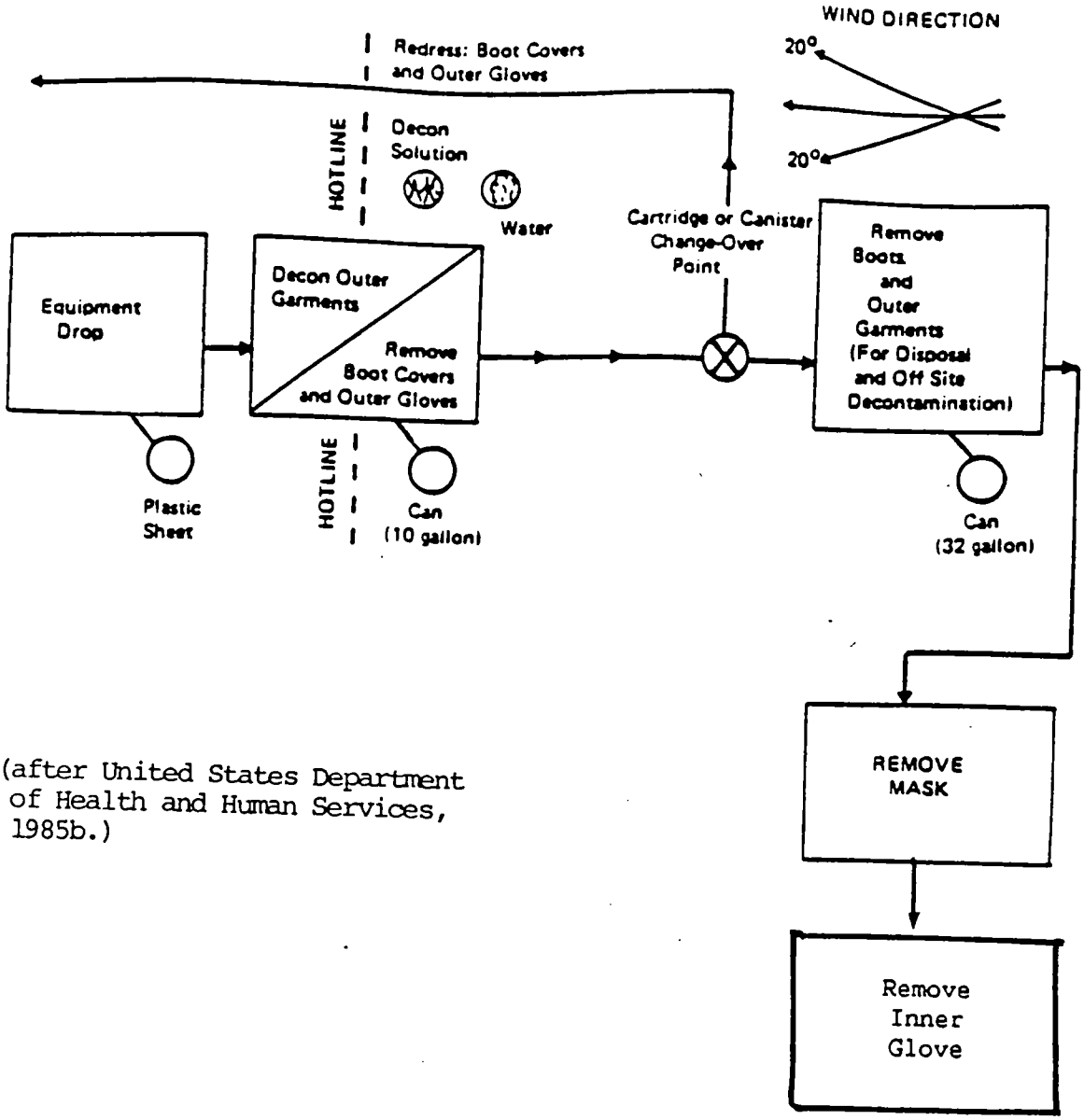
(after United States Department of Health and Human Services, 1985b.)

FIGURE 4
MINIMUM DECONTAMINATION LAYOUT
LEVEL B PROTECTION



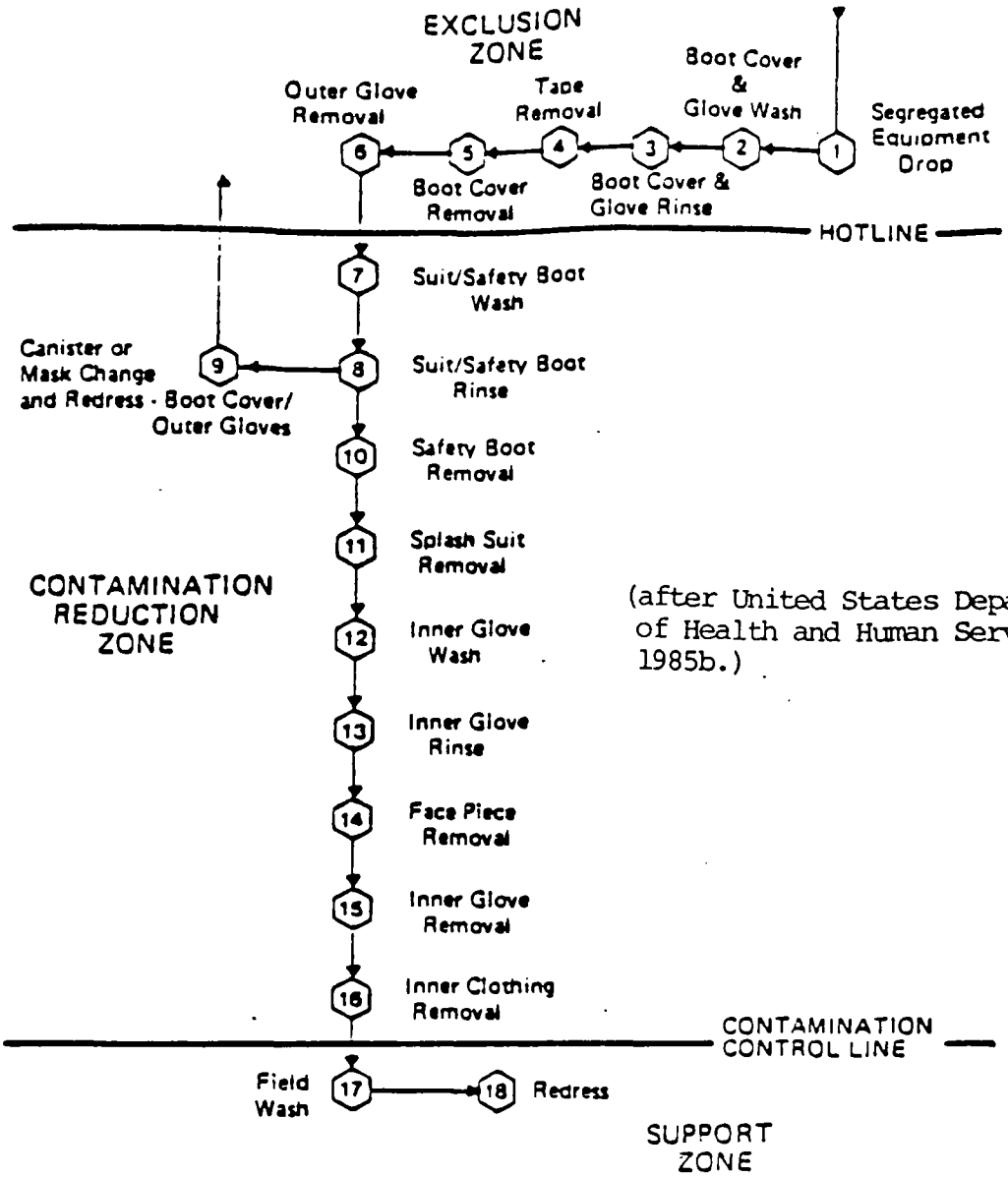
(after United States Department of Health and Human Services, 1985b.)

FIGURE 5
MAXIMUM DECONTAMINATION LAYOUT
LEVEL B PROTECTION



(after United States Department of Health and Human Services, 1985b.)

FIGURE 6
MINIMUM DECONTAMINATION LAYOUT
LEVEL C PROTECTION



(after United States Department of Health and Human Services, 1985b.)

FIGURE 7
MAXIMUM DECONTAMINATION LAYOUT
LEVEL C PROTECTION

Vehicular entry and egress from the exclusion zone will be restricted to a single controlled point. A vehicle wash station will be constructed by the subcontractor. This wash station must collect the wash water and pump it to a water collection pool.

In addition to receiving vehicle wash water, the pool receives all other various decontamination wastewaters.

3.1.2 Subcontractor Drilling Requirements

During well installation, the subcontractor will monitor for organic vapors that could be released to the air from contaminated drill cuttings. An HNu photoionization detector and/or OVA flame ionization detector, or similar comparable equipment with EPA approval, will be used for this monitoring. Well installation will be initiated in Level C (or higher) and may be downgraded to Level D upon evaluation of monitoring data.

Before moving to another borehole position, the drilling equipment will be taken to the wash station. There, the equipment will be thoroughly decontaminated for the next boring. All drill cuttings and ground water produced from monitoring well installation and development shall be properly drummed.

The subcontractor personnel operating the drilling equipment will follow appropriate guidance to minimize physical contact with drill cuttings and ground water.

3.2 Site Security

Presently, the Bluff Road site is circumscribed by a chain-link fence. The entrance near Bluff Road will be the main entrance and access will be monitored by onsite supervisors during normal working hours. The gate will be locked at night. The subcontractor will be responsible for site security during the working day and locking the gate at night.

3.2.1 Signs and Barriers

The exclusion zone, contamination reduction corridor, and the support area will be clearly marked and delineated.

3.2.2 Site Access

All personnel involved with the onsite remedial investigation activities will be issued a colored, serialized badge to keep on their person throughout the remedial investigation. All visitors or personnel not holding proper training and medical certification for site access shall receive a white, serialized badge and remain in the support area.

3.3 Air Monitoring

Air quality monitoring will consist of periodic (e.g., initially four times per hour and downgrade to four times per day after a routine is set) monitoring during all on-site activities. Those activities which require intrusion into the subsurface, such as ground water monitoring, soil sampling (e.g., check soil cuttings and breathing zone at each vertical sampling interval), and well drilling activities will require more frequent air monitoring. The collected data serve as input decisions regarding worker protective measures, routine work procedures, and emergency response.

Flame ionization detectors (FIDs) or photoionization detectors (PIDs) are commonly used to provide data on total organic vapor concentrations in and around the breathing zone of workers.

3.4 Daily Safety Briefings

The onsite manager, site health and safety officer, and all onsite investigations personnel will attend a mandatory daily meeting to discuss any changes in site safety status, safety violations and administrative

actions, work assignments, and modification of procedures. This meeting will be scheduled as the first activity of each day.

In the event of a safety violation, the nature of the violation, the past record of the violator, and any extenuating circumstances will be reviewed. The site health and safety officer will provide a recommendation to the site manager regarding administrative actions such as:

- o Retraining and reassignment.
- o Change in clearance status.
- o Permanent dismissal from the site.

3.5 Daily Debriefing Meetings

The health and safety officer and onsite manager will meet at the end of each day to discuss daily progress, technical problems, administrative resolution of disciplinary actions, and monitoring and analytical findings.

4.0 SAFETY STANDARDS

The assigned subcontractor shall implement safety procedures for all onsite personnel following OSHA Regulations 29 CFR 1910.120. These standards will be followed for the anticipated conditions at the Bluff Road site. All onsite employee working activities will follow the standard operating procedures designated.

The use of personnel protective equipment by project team members and subcontractors is related to the nature and concentration of the chemical exposure. Action levels for employee respiratory protection will be based upon concentrations of airborne contaminants measured during site air quality monitoring. Action levels for protective clothing will be based on dermal contact potential.

4.1 On Site Action Levels

Within the daily work area, organic vapor measurements at the breathing zone will be used to justify rapid response to excessive airborne contaminant levels. A response scheme has been developed, defining general actions to be taken at observed sustained concentrations of organic vapors during area monitoring.

In developing these action levels for benzene, the assumption is made that all of the observed organic vapor (OV) concentrations are attributable to benzene (which has the lowest TWA). A margin of safety was included to account for the contribution of other unknown contaminants. In this context, "sustained" implies a concentration that maintains a constant level for 30 seconds. The basic responses to air concentrations observed during area monitoring and the corresponding the level of safety required to perform on-site activities are as follows:

Level D No deviation from background readings.

Level C — Organic vapor concentrations of <5.0 ppm (0.5 TWA for benzene) and not immediately dangerous to life and health. Requires: full face respirator with organic vapors/acid gas (OV/AG) protective cartridges with high efficiency pre-filters.

Level B — OV concentrations between 5-50 ppm. Requires supplied air respirators or self-contained air units. Take immediate actions to reduce the concentration to which workers are exposed by relocating personnel, temporary suspension of an operation if applicable, or other accepted means of exposure control.

Level A — If OV concentration is above 50 ppm. Remove personnel from area of high concentrations and assess the situation.

It is anticipated that Level C or better protection will be used in the old container storage area. Level D or better protection will be used at all other areas on-site. Employees will be informed of the level of protection for daily activities.

If a particular activity appears to consistently result in high employee exposure (i.e., more than TWA), additional employee training for improved work habits, and/or other administrative action will be taken to reduce chronic exposure levels.

5.0 PROTECTIVE EQUIPMENT

All employees working within the daily designated site areas will be issued the required safety equipment and protective clothing prior to initiating site investigation activities. The Site Health and Safety Officer will maintain a complete record of equipment issued to and returned by site personnel.

The minimum protective equipment (Level D protection) that is required to be worn by all personnel entering the designated work zone or drilling is as follows:

- o Tyvek or similar full body disposable coveralls.
- o Hard hat.
- o Rubber or neoprene overboots.
- o Steel-toed boots.
- o Full-face respirator to be carried by each person at all times.
- o Nitrile, neoprene, or viton overgloves (taped to seal openings).

It is anticipated that collection of surface water samples away from the actual work site will not require any protective clothing except for hand protection (i.e., gloves). The site Health and Safety Officer will make the decision when to increase or decrease levels of personnel protection if there is any question.

5.1 Respiratory Protection

The type of respiratory protection used by employees on the site at any time will be continuously assessed based on the level of chemical exposure, as determined by the results of PID or FID determinations. In other areas (i.e., offsite) , all persons will carry a respirator in the event higher than expected levels of air contamination are encountered by air monitoring. In situations where high levels of air contamination (>5.0 ppm) may be encountered, five minute escape packs will be carried.

5.1.1 Respirator Selection

Each employee will be issued a full-face air-purifying respirator. Respirator cartridges (OV/AG) will be approved for a maximum use concentration of ten times the concentration of the permissible exposure limits of organic vapors. Pre-filters approved for dust, mist and fumes will be used with the cartridges. Self-contained air units will be maintained on-site and made available to employees when air contaminant concentrations exceed Level C exposure criteria.

5.1.2 Respirator Maintenance

Respirators will be inspected by the individual before and after each use and those respiratory protective devices not in routine use at the site will be inspected by the Site Health and Safety Officer at least weekly. Respirator cartridges and filters that have exceeded their service life of use will be replaced.

Routinely used respirators will be cleaned, disinfected, and inspected daily to help assure proper protection. If, in the cleaning or inspection of the respirators by the users, broken or nonfunctioning parts are discovered, a replacement part or new respirator will be issued. Respirators will be stored in an area where they will be protected against damage by dust, heat, extreme cold, excessive moisture, or chemical contact.

5.2 Personal Hygiene

Subcontractors will implement hygiene practices consistent with work hazards. Signs will be posted at the site indicating relevant hazards. Working areas will be posted with information related to employee hygiene requirements for entrance into specific areas.

Eating and food preparation or dispensing will be prohibited in any area other than those designated and properly protected in the support

zone. No food or beverages will be permitted in the work area, including items such as candy, gum, snuff, and chewing tobacco. Smoking will be allowed only in the support zone.

Employees leaving the site or who handle contaminated soil or articles must remove all protective clothing and wash (i.e., face, hands, arms) with soap or mild detergent and water before they are permitted to enter the eating areas. Additionally, workers will shower as soon as possible after leaving the site at the end of each work day. The Site Health and Safety Officer will perform inspections and document unsafe conditions. Willfull or repeated violators will be removed from the job site.

5.3 Protection for Decontamination Workers

The level of protection worn by decontamination workers is determined by:

- Expected or visible contamination on workers.
- Type of contaminant and associated respiratory and skin hazards.
- Total vapor/gas concentrations in the CRC.
- The presence (or suspected presence) of highly toxic or skin-destructive materials.

In most cases, decontamination workers will wear Level D protection. Level D includes hard hat, safety glasses, chemical-resistant boots and gloves, and protective clothing. The body covering recommended is chemical-resistant overalls with an apron, or chemically-resistant overalls and jacket. Workers who are performing more rigoious decontamination tasks (i.e., decontamination of drill rigs with a steam cleaner) will require additional equipment such as face shields and water resistant splash suits.

6.0 HEAT STRESS MONITORING

When the subcontractor assigns personnel to wear personal protective equipment, an on-site medical monitoring program for protection against heat fatigue and stress is implemented. This monitoring program is based on NIOSH guidelines and incorporates the recommended work/test regimen and vital sign monitoring.

The work/rest regimen will be determined by periodically measuring Wet Bulb-Globe Temperature (WBGT) equivalents using Botsball thermometer placed around the work zone and applying published work/rest intervals to the temperature readings.

Vital signs of heart rate, oral temperature and daily body water loss will be monitored using the following criteria as further protection of personnel. This physiological monitoring program will be instituted at the discretion of the On-Site Health and Safety Officer if the WBGT work/rest regimen proves to be insufficient for all workers or is too restrictive. The physiological monitoring approach takes into account individual physiological conditioning and endurance and therefore established safe work/rest patterns based on each individual's ability to endure heat. If the physiological monitoring program is invoked by the Health and Safety Officer, it will be administered by persons certified, at a minimum, as Emergency Medical Technicians.

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.

  If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same time.

  If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.

- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

If oral temperature exceeds 99.6°F (37.6°C) at the beginning of the rest period, shorten the following work cycle by one-third.

Do not permit a worker to wear a semipermeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C).

- Body water loss, if possible. Measure weight on a scale accurate to ±0.25 lb at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing or, if possible, when nude. Weight loss should not exceed 1.5 percent total body weight in a work day.

7.0 EMERGENCY PROCEDURES

The Health and Safety Program for this project has been established to allow site operations to be conducted without adverse impacts on worker health and safety and the general public. In addition, supplementary emergency response procedures have been developed to cover extraordinary conditions that might possibly occur at the site.

7.1 General

All accidents and unusual events will be dealt with in a manner to minimize continued health risk of site workers and the general public. In the event that an accident or other unusual event occurs, the following procedure will be followed:

- First aid or other appropriate initial action will be administered by those close to the accident/unusual event. This assistance will be conducted in a manner to assure that those rendering assistance are not placed in a situation of unacceptable risk. Listings of on-site Emergency Medical Technicians will be posted in prominent locations.

- All accidents/unusual events must be reported to the U.S. EPA and to the Site Health and Safety Officer and the On-Site Manager. The Site Manager is responsible for conducting the emergency response in an efficient, rapid manner, and off-site assistance and/or medical treatment is required and he will arrange for assistance. Off-site coordination and assistance procedures will be prearranged with local ambulance companies, hospitals, and doctors or other medical specialists.

- All workers on site are responsible to conduct themselves in a mature, calm manner in the event of an accident/unusual event. All personnel must conduct themselves in a manner to avoid spreading the danger to themselves and to surrounding workers.

The following emergency equipment will be available at designated locations on the site:

- First aid kit.
- Fire extinguisher(s) (dry powder, 30 lbs) and blanket.

- o Cool wet towels or sheets.
- o Stretcher.
- o Emergency eyewash station.
- o Hand-held alarm horns.
- o Emergency shower.
- o Egress air packs.
- o Plentiful supply of potable water.

7.1.1 Emergency Horn

All personnel will be informed of an emergency situation which requires suspension of site operations; egression from the work area; emergency responses; and if necessary, site evacuation via continual long horn blasts as defined during employee training. Radio communication will also be used.

7.1.2 Notification List

The names and phone numbers of all personnel and agencies that could be involved in emergency response will be established by the Site Health and Safety Officer and posted at several prominent locations at the site. Table 2 provides the notification list for use at the site.

7.1.3 Evacuation Plan

Although very unlikely, it is possible that a site emergency could necessitate evacuating all personnel from the site. If such a situation should arise, the Site Health and Safety Officer will notify the On-Site Manager and the on-scene U.S. EPA representative of this event and the appropriate horn blast given for site evacuation. It is the responsibility of these individuals to evacuate personnel in a calm, controlled fashion. The notification list is presented in Table 2.

All available vehicles located outside the work zone will be used in the evacuation. All personnel will exit the site and be taken to a rendezvous point selected by the Site Health and Safety Officer during the morning safety meeting depending on wind direction, severity and type of incident, etc. The evacuation routes will be via the main access road to the landfill, proceeding to a predetermined location.

TABLE 3
NOTIFICATION LIST

The event of a fire, uncontrollable chemical spill, explosion, severe earthquake or any occurrence that might damage personnel or adjacent property will require the immediate notification of the proper emergency service. The proper emergency service is determined by the nature of the emergency.

EMERGENCY OR DISASTER NOTIFICATION PROCEDURE

Fire Department and Emergency Squad	(803) 252-2911
Richland County Sheriff	(803) 779-6100
Columbia Police	(803) 252-2911
Baptist Hospital	(803) 771-5050

Directions to Baptist Hospital: Bluff Road toward Columbia. Pass State Fair Grounds. Turn left at McDonald's on Assembly. Turn right at Taylor Street. Go two lights, turn right. Hospital at corner.

Richland Memorial (803) 765-6111

PROCEDURE FOR REPORTING ACCIDENTS

IMMEDIATELY CALL:

In case of emergency situation immediately contact the U.S.EPA, Subcontractor and Contractor Project Managers

After notification of the proper emergency services, proceed to deal with the emergency at hand.

The On-Site Manager's log of on-site personnel will be used to ensure that all individuals are accounted for. If someone is missing, the Site Health and Safety Officer will alert the appropriate on-site and county emergency personnel. Control of personnel at the rendezvous point is the responsibility of the On-site Manager or his designated assistant.

As part of the overall evacuation planning activities, the county emergency prepareness personnel will be contacted and informed of the nature of emergencies which may occur at the site and the access routes for evacuation of the site when necessary. Prior to initiation of the on-site activities, subcontractor and county personnel will review the on-site evacuation routes to ensure all participants are familiar with the routes.

7.2 Medical Emergencies

Four types of medical emergency require implementaton of emergency procedures. These emergencies are cardio-pulmonary emergencies, physical injuries, heat related injuries, and chemical exposure. Provisions will be made with local authorities or a local ambulance squad to ensure that an emergency response team, comprised of at least two trained Emergency Medical Technicians, will be prepared to respond to any situation in the appropriate level of personal protective equipment for the site. The following sections contain general procedures for the specific medical emergency categories identified above.

7.2.1 Cardio-Pulmonary Emergencies

Cardio-pulmonary emergencies are life-threatening situations requiring immediate response of trained individuals to prevent death. At no time will these emergencies be considered less than life-threatening. These emergencies include heart attack, cardiac arrest, or respiratory arrest. Response and emergency treatment will be rendered without regard

to protective equipment and decontamination procedures. As a precaution, a representative from the site will accompany the worker to the hospital in order to advise on matters of decontamination.

The responding emergency medical technicians will be fully trained and prepared to administer generally accepted response, including CPR, vital sign monitoring, patient comfort, and preparation for transport.

7.2.2 Physical Injuries

Physical injuries can range from minor sprains to internal injuries to an open compound fracture. Depending on the severity of the injury, treatment may be delayed for decontamination procedures to be performed. The level of decontamination will be directly related to the seriousness of the injury and will be determined by the site Health and Safety Officer or designee.

The outside garments can be removed (depending on the weather) if they do not cause delays, interference with treatment, or aggravate the injury. Respiratory masks or backpack assembly must always be removed, unless a spinal injury is suspected. Fully encapsulating suits or chemical-resistant clothing can be cut away. If the outer contaminated garments cannot be safely removed, the individual should be wrapped in blankets to help prevent contaminating the inside of the ambulances and/or medical personnel. Outside garments are then removed at the medical facility. One exception would be if it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life. For minor medical problems or injuries, the normal decontamination procedure should be followed.

If an employee working in a contaminated area is physically injured, appropriate first aid procedures will be followed. Depending on the

severity of the injury, emergency medical response may be sought. If the employee can be moved, he will be taken to the edge of the work area (on a stretcher, if needed) where contaminated clothing will be removed, additional emergency first aid will be administered; and transportation to a local emergency medical facility will be scheduled.

7.2.3 Heat Related Emergencies

Even when a stringent heat stress monitoring program is implemented, there is the possibility that heat related injuries can occur. These injuries can range from heat cramps to life threatening heatstroke. Treatment of individuals suffering from any of these injuries will be administered by qualified personnel.

Heat cramps will be treated by administration of water, removal of the individual to a cool, shaded location, and rest.

Heat exhaustion will be treated by elevating the individual's feet, transporting to a cool, shaded area, administration of water, application of cool compresses, and transport to emergency facility if individual response is not rapid and full.

Heatstroke will be treated as a true medical emergency. Notification procedures will be initiated as soon as an individual has been diagnosed as suffering from heatstroke. The attending EMT will attempt to decrease the body temperature as rapidly as possible by applying cold wet sheets or compresses and placing the individual supine, feet elevated, in an air conditioned environment until transportation to emergency care facilities.

7.2.4 Chemical Exposure

Chemical exposure emergencies can be divided into two categories:

- Injuries from direct contact, such as acid burns or inhalation of toxic chemicals.

- Potential injury due to gross contamination on clothing or equipment.

For the inhaled contaminant, treatment can only be provided by qualified physicians. If the contaminant is on the skin or in the eyes, immediate measures must be taken to counteract the substance's effect. First aid treatment usually is flooding the affected area with water.

When protective clothing is grossly contaminated, contaminants may be transferred to treatment personnel or the wearer and cause injuries. Unless severe medical problems have occurred simultaneously with splashes, the protective clothing should be washed off as rapidly as possible and carefully removed. Portable eye washes and high pressure sprayers will be available to provide a means of flushing and washing such contamination.

If the injury to the worker results from a chemical splash or uncontrolled release, the following first aid procedures are to be instituted:

- Eye Exposure - If contaminated solids or liquids get into the eyes, wash eyes immediately at the emergency eyewash station using large amounts of water and lifting the lower and upper lids occasionally. Obtain medical attention immediately. Contact lenses will not be worn when working on the site.

- Skin Exposure - If contaminated solids or liquids get on the skin, or penetrate through the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. Obtain medical attention immediately when exposed to concentrated solids and liquids.

- Breathing - If a person breathes in large amounts of contaminants, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration immediately. Keep the affected person warm and at rest. Obtain medical attention as soon as possible.

- Swallowing - When contaminated solids or liquids have been swallowed and the person is conscious. Attempt to obtain information to aid in identifying the substance swallowed from the

person. Contact the poison control center immediately. Under their direction one or two glasses of milk or water may be administered to dilute the swallowed material. The poison control center may direct responder to induce vomiting. Do not induce vomiting if: (1) the person is unconscious or semiconscious, or having a convulsion, (2) if a strong corrosive has been swallowed, or (3) if a petroleum product has been swallowed. Vomiting is best induced by administering one tablespoon of syrup of ipecac. Transport the person to the hospital and monitor the airway constantly.

7.3 Fires

Fire extinguishers should be available with the drilling equipment, and at the on-site Field Office and exclusion and support zones. If a small localized fire breaks out, chemical fire extinguishers will be used to bring the occurrence under control. If necessary and feasible, a fire blanket, soil, or other inert materials will be placed on the burning area to extinguish the flames and minimize the potential for spreading. If appropriate, local assistance.

If an uncontrolled fire develops releasing potentially toxic gases, on-site personnel and the public in the immediate vicinity will be evacuated. Only personnel trained in fire fighting and outfitted with proper protective equipment will be allowed in the immediate fire area. The On-site Manager or his designated assistant will alert local fire-fighting companies.

7.4 Unusual Objects or Events

When unusual objects (e.g., gas cylinders, underground tanks, bulging drums, fuming containers) are encountered, the On-site Manager will halt operations and notify the Site Health and Safety Officer and Site Manager. The Site Manager will consult the U.S. EPA to decide on the next course of action.

7.5 Emergency Notification Procedure

In the event of an on-site emergency requiring notification of off-site personnel, the On-site Manager is responsible for immediately notifying the agencies and personnel listed in Table 2. If for some reason the On-site Manager is unavailable, the Site Health and Safety Officer must perform this function. The On-site Manager will notify the Site Manager as soon as practical after the emergency. The U.S. EPA Project Manager will be apprised of the situation immediately after the existence of the emergency. If the U.S. EPA Project Manager is not on-site when the accident occurs, the Site Manager will immediately inform U.S. EPA and the Contractor Project Manager.

The Site Health and Safety Officer will provide a report to the Site Manager and Corporate Health and Safety Manager describing the following:

- The event (including date and time) that necessitated the notification and the basis for that decision.
- Date, time, and names of all persons/agencies notified and their response.
- Resolution of the incident (including duration) and the method/corrective action involved.

This report will be submitted within one working day of the event. These reports will be part of the project file and will be submitted to the U.S. EPA and Subcontractor Project Managers within one week after the event.

REFERENCES

Chemtox Data 1987. Van Nostrand Reinhold Company, Inc.

Department of Labor, Occupational Safety and Health Administration. December 19, 1986. 29 CFR Part 1910, Hazardous Waste Operations and Emergency Response; Interim Final rule. Federal Register, Volume 51, No. 244. Pages 45654-45675.

Golder Associates. October 17, 1985. Letter from Golder Associates to SCDHEC detailing air survey of aboveground tank.

Golder Associates. 1986. Remedial Investigation, Bluff Road Site, Richland County. Prepared for South Carolina Department of Health and Environmental Control. January. Revised April, 1986.

South Carolina Department of Health and Environmental Control. 1981. Investigation of Groundwater at South Carolina Recycling and Disposal Company, Bluff Road Site, Richland County, South Carolina.

U.S. Department of Health and Human Services. 1985a. NIOSH Pocket Guide to Chemical Hazards Washington D.C. NOISH Publication No. 78-210.

U.S. Department of Health and Human Services 1985b. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. Publication No. 85-115.

U. S. Environmental Protection Agency. September 1, 1982. Site Safety Protocol, Bluff Road Site, Remedial Action.

U.S. Environmental Protection Agency. February 7, 1980. Memo on original inspection of site.

APPENDIX A

CHEMICAL FACT SHEETS FOR COMPOUNDS OF CONCERN AT THE BLUFF ROAD SITE

CHEMTOX RECORD 59 3 4 00181 LAST UPDATE OF THIS RECORD: 12/26/86

NAME: BENZENE

SYNONYMS: BENZOL; COAL TAR NAPHTHA; CYCLOHEXATRIENE; PHENYL HYDRIDE; PHENE; COAL NAPHTHA; PYROBENZOL

[redacted]S: 71-43-2 RTECS: CY1400000

FORMULA: C6H6 MOL WT: 78.11

CHEMICAL CLASS: AROMATIC

PHYSICAL DESCRIPTION: COLORLESS TO PALE YELLOW WATERY LIQUID WITH A GASOLINE-LIKE ODOR

BOILING POINT: 353.15 K 80 C 176 F

MELTING POINT: 278.71 K 5.5 C 42 F

FLASH POINT: 262 K -11.2 C 11.9 F

VAPOR PRESSURE: 75 mm @ 20 C

AUTO IGNITION: 864.8 K 591.6 C 1096.9 F

UEL: 7.1 % LEL: 1.3 %

IONIZATION POTENTIAL (eV): 9.25

VAPOR DENSITY: 2.77 air=1

SPECIFIC GRAVITY: 0.86-0.88 20C

DENSITY: 0.8794 @20 C

WATER SOLUBILITY: 0.06%

INCOMPATIBILITIES: STRONG OX, CHLORINE, BROMINE WITH IRON

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: OXIDIZING MATERIALS(BR, F2, CL2, CrO3, NaClO4, O2, O3), PERCHLORATES (AlCl3 +NaClO4), H2SO4 & PERMANGANATES), K2O2, (ASCLO4 & ACETIC ACID), Na2O2 Source: SAX

[redacted]TABILITY DURING TRANSPORT: No Data

[redacted]UTRALIZING AGENTS: No data

[redacted]LYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: VAPOR IS HEAVIER THAN AIR AND MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK.

ODOR DETECTED AT (ppm): 4.68

ODOR DESCRIPTION: LIKE BENZENE, TOLUENE, AND XYLENE Source: CHRIS

100 % ODOR DETECTION: No data

DOT HAZARD CLASS: Flammable liquid

DOT GUIDE: 27

DOT ID NUMBER: UN1114

DOT SHIPPING NAME: BENZENE

STCC NUMBER: 4908110

EPA WASTE NUMBER: U019

CERCLA REF: Y

RQ DESIGNATION: C 1000 pounds (454 kg)

SARA TPQ VALUE: Not listed

CLEAN AIR ACT: Y

NFPA CODES:

HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.

FLAMMABILITY (RED) : (3) This material can be ignited under almost all temperature conditions.

[redacted]REACTIVITY (YELLOW): (0) Stable even under fire conditions.

SPECIAL : Unspecified

TARGET ORGANS: BLOOD, CNS, SKIN, BONE MARROW, EYES, RESP SYS

SYMPTOMS : IRRIT EYES, NOSE, RESP SYS; GIDDY; HEAD, NAU, STAGGERED GAIT; FTG, ANOR, LASS; DERM; BONE MARROW DEPRES; ABDOM PAIN Source: SAX

3 4 00182

CONC IDLH: 2000PPM

RMISSIBLE EXPOSURE (OSHA): 10 ppm

RCINOGEN?: Y STATUS: HUMAN POSITIVE

REFERENCES:

HUMAN SUSPECTED IARC** 7,203,74
HUMAN SUSPECTED IARC** 28,151,82
ANIMAL SUSPECTED IARC** 28,151,82
ANIMAL SUSPECTED IARC** 29,93,82
HUMAN POSITIVE IARC** 29,93,82
ANIMAL INDEFINITE IARC** 7,203,74

CARCINOGEN LISTS:

IARC: Carcinogen as defined by IARC as carcinogenic to humans, with sufficient epidemiological evidence.
NIOSH: Carcinogen defined by NIOSH with no further categorization.
NTP: Carcinogen defined by NTP as known to be carcinogenic, with evidence from human studies.
ACGIH: Carcinogen defined by ACGIH TLV Committee as a suspected carcinogen, based on either limited epidemiologic evidence or demonstration of carcinogenicity in experimental animals.

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

orl-hmn TDLo:130 mg/kg AHYGAJ 31,336,1897 BEHAVIORAL Somnolence(general depressed activity) BEHAVIORAL Changes in motor activity(specific assay) GASTROINTESTINAL Nausea or vomiting

ihl-hmn LCLo:20000 ppm/5M 29ZUA8 -,-,53

inl-hmn TCLo:210 osm 27ZXA3 -,183,80 BEHAVIORAL Euphoria BEHAVIORAL Hallucinations, distorted perceptions GASTROINTESTINAL Nausea or vomiting

inl-hmn TCLo:100 osm INMEAF 17,199,48 BEHAVIORAL Somnolence(general depressed activity) GASTROINTESTINAL Nausea or vomiting SKIN AND APPENDAGES Skin - after systemic exposure Dermatitis,other

LD50 (mg/kg): 4894 SPECIES: ORAL RAT

PROTECTION SUGGESTED:
CHRIS MANUAL:
HYDROCARBON VAPOR CANISTER. SUPPLIED AIR OR HOSE MASK: HYDROCARBON-INSOLUBLE RUBBER OR PLASTIC GLOVES; CHEMICAL GOGGLES OR FACE SPLASH SHIELD: HYDROCARBON-INSOLUBLE APRON SUCH AS NEOPRENE.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly wash with soap when skin becomes contaminated.

** REMOVE CLOTHING:

Immediately remove any clothing that becomes wet to avoid any flammability

** REFERENCE: NIOSH 3 4 00183

COMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
JSH (BENZENE)
Greater at any detectable concentration. : Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.
FIRST AID (NIOSH):
EYE:
IRR IMMED
SKIN:
SOAP WASH PROMPTLY
INHALATION:
ART RESP
INGESTION:
NO VOMIT

FIRST AID (CHRIS):
EYE:
FLUSH WITH PLENTY OF WATER UNTIL IRRITATION SUBSIDES.
SKIN:
FLUSH WITH WATER FOLLOWED BY SOAP AND WATER; REMOVE CONTAMINATED CLOTHING
) WASH SKIN.
ALATION:
REMOVE FROM EXPOSURE IMMEDIATELY. CALL PHYSICIAN. IF BREATHING IS IRREGULAR OR STOPPED, START RESUSCITATION, ADMINISTER OXYGEN.
INGESTION:

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.3
DOT SHIPPING NAME: BENZENE
DOT ID NUMBER: UN1114

POTENTIAL HAZARDS DOT GUIDE NUMBER 27

*FIRE OR EXPLOSION
Will burn. May be ignited by heat, sparks and flames.
Flammable vapor may spread away from spill.
Container may explode in heat of fire.
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.

*HEALTH HAZARDS
Vapors may cause dizziness or suffocation.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away.
Stay upwind; keep out of low areas.
Isolate hazard area and deny entry.

Wear self-contained breathing apparatus and full protective clothing.
Isolate for 1/2 mile in all directions if tank or tankcar is involved in fire.
FOR EMERGENCY ASSISTANCE CALL CHEMTREC (800) 424-9300.
Also, in case of water pollution, call local authorities.

*FIRE 3 4 00184

Small Fires: Dry chemical, CO2, water spray or foam.
Large Fires: Water spray, fog or foam.
Move container from fire area if you can do it without risk.
Stay away from ends of tanks.
Cool containers that are exposed to flames with water from the side until well after fire is out.
For massive fire in cargo area, use unmanned hose holder or monitor nozzles.
If this is impossible, withdraw from area and let fire burn.
Withdraw immediately in case of rising sound from venting safety device or discoloration of tank.

*SPILL OR LEAK

No flares, smoking or flames in hazard area.
Stop leak if you can do it without risk.
Use water spray to reduce vapors.
Small Spills: Take up with sand, or other noncombustible absorbent material, then flush area with water.
Large Spills: Dike far ahead of spill for later disposal.

*FIRST AID

Move victim to fresh air: call emergency medical care.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.
In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes.
Remove and isolate contaminated clothing and shoes.

CHEMTOX DATA

CHEMTOX RECORD 398 LAST UPDATE OF THIS RECORD: 09/19.

3 4 00185

NAME: TOLUENE
SYNONYMS: TOLUOL; PHENYL METHANE; METHYL BENZENE; BENZENE, METHYL-
CAS: 108-88-3 RTECS: XS5250000
FORMULA: C7H8 MOL WT: 92
CHEMICAL CLASS: AROMATIC HC

PHYSICAL DESCRIPTION: COLORLESS WATERY LIQUID WITH A PLEASANT ODOR
BOILING POINT: 383.6 K 110.4 C 230.8 F
MELTING POINT: 178.00 K -95.2 C -139.3 F
FLASH POINT: 277.6 K 4.4 C 40 F
VAPOR PRESSURE: 0.037 @ 298
AUTO IGNITION: 809 K 535.8 C 996.5 F
UEL: 7.1 % LEL: 1.3 %
IONIZATION POTENTIAL (eV): 8.82
VAPOR DENSITY: air=1
SPECIFIC GRAVITY: 0.867 20C
DENSITY: 0.867 g/cc or 8.0631 lb/gal
WATER SOLUBILITY: 0.05%
INCOMPATIBILITIES: STRONG OX
REACTIVITY WITH WATER: No data on water reactivity
REACTIVITY WITH COMMON MATERIALS: No data
STABILITY DURING TRANSPORT: No Data
NEUTRALIZING AGENTS: No data
POLYMERIZATION POSSIBILITIES: No data
TOXIC FIRE GASES: None reported other than possible unburned vapors
ODOR DETECTED AT (ppm): 0.17
ODOR DESCRIPTION: PUNGENT; AROMATIC, BENZENE-LIKE; DISTINCT, PLEASA
100 % ODOR DETECTION: No data

DOT HAZARD CLASS: Flammable liquid
DOT GUIDE: 27
DOT ID NUMBER: UN1294
DOT SHIPPING NAME: TOLUENE
STCC NUMBER: 4909305

EPA WASTE NUMBER: U220
CERCLA REF:
RQ DESIGNATION: C 1000 pounds (454 kg)
SARA TPQ VALUE: Not listed
CLEAN AIR ACT:

NFPA CODES:
HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered wit
self-contained breathing apparatus.
FLAMMABILITY (RED) : (3) This material can be ignited under almost all
temperature conditions.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

TARGET ORGANS: CNS, LIVER, KIDNEYS, SKIN, EYES
SYMPTOMS : FAINTING, WEAKNESS, CONF, EUPHORIA, DIZZINESS, HEADACHE; DIAL PUPILS, LACRIMATION, NER., MUSCLE FATIGUE, INSOMNIA, PARESTHESIAS, DERM PHOTO, CNS, PSYCHOTROPIC EFFECTS, MUSC FTG, INSOM]PARESTHESIAS, DERM PHOTO Source: SAX
CONC IDLH: 20000]
PERMISSIBLE EXPOSURE (OSHA): 200 ppm

CARCINOGEN?: NO STATUS:
REFERENCES:

CARCINOGEN LISTS:
IARC: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH:Not listed.

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
ihl-hmn TCLo:200 ppm JAMAAP 123,1106,43 BRAIN AND COVERINGS Recordings from specific areas of CNS BEHAVIORAL Antipsychotic BLOOD Changes in bone marrow not included above

LD50 (mg/kg): 5000 SPECIES: oral-rat

PROTECTION SUGGESTED:
CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes wet.

** REMOVE CLOTHING:
Immediately remove any clothing that becomes wet to avoid any flammabi

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
NIOSH (TOLUENE)
1000 ppm: Any chemical cartridge respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any supplied-air respirator. * Substance reported to cause eye irritation or damage may require eye protection. / Any powered air-purifying respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. * Substance reported to cause eye irritation or damage may require eye protection.
2000 ppm: Any supplied-air respirator operated in a continuous flow mode. * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece. / Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister.
EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.
FIRST AID (NIOSH):
EYE:
IRR IMMED
SKIN:
SOAP WASH PROMPTLY
INHALATION:
ART RESP
INGESTION:
NO VOMIT

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.3
DOT SHIPPING NAME: TOLUENE
DOT ID NUMBER: UN1294

POTENTIAL HAZARDS DOT GUIDE NUMBER 27

*FIRE OR EXPLOSION
Will burn. May be ignited by heat, sparks and flames.
Flammable vapor may spread away from spill.
Container may explode in heat of fire.
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.

*HEALTH HAZARDS
Vapors may cause dizziness or suffocation.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away.
Stay upwind: keep out of low areas.
Isolate hazard area and deny entry.
Wear self-contained breathing apparatus and full protective clothing.
Isolate for 1/2 mile in all directions if tank or tankcar is involved fire.
FOR EMERGENCY ASSISTANCE CALL CHEMTREC (800) 424-9300.
Also, in case of water pollution, call local authorities.

*FIRE
Small Fires: Dry chemical, CO2, water spray or foam.
Large Fires: Water spray, fog or foam.
Move container from fire area if you can do it without risk.
Stay away from ends of tanks.
Cool containers that are exposed to flames with water from the side until well after fire is out.
For massive fire in cargo area, use unmanned hose holder or monitor nozzles.
If this is impossible, withdraw from area and let fire burn.
Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

*SPILL OR LEAK
No flares, smoking or flames in hazard area.
Stop leak if you can do it without risk.
Use water spray to reduce vapors.
Small Spills: Take up with sand, or other noncombustible absorbent

material, then flush area with water.
Large Soills: Dike far ahead of soill for later disoosal.

*FIRST AID

Move victim to fresh air; call emergency medical care.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.
In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes.
Remove and isolate contaminated clothing and shoes.

CHEMTOX RECORD 206 3 4 00189 LAST UPDATE OF THIS RECORD: 02/19/

NAME: ETHYL BENZENE

SYNONYMS: AETHYLBENZOL (German); EB; ETHYLBENZEEN (Dutch); ETHYL BENZENE; ETHYL BENZENE (DOT); ETHYLBENZOL; ETILBENZENE (Italian); ETYLOBENZEN (Polish); NCI-C56393; PHENYLETHANE

CAS: 100-41-4 RTECS: DA0700000

FORMULA: C8H10 MOL WT: 106.18

CHEMICAL CLASS:

PHYSICAL DESCRIPTION: COLORLESS LIQUID WITH A SWEET, GASOLINE-LIKE ODOR.

BOILING POINT: 255.38 K -17.8 C 0 F

MELTING POINT: 178.15 K -95 C -139 F

FLASH POINT: 255 K -18.2 C -.7 F

VAPOR PRESSURE: 10mm @ 25.9 C

AUTO IGNITION: 733 K 459.8 C 859.7 F

UEL: 6.7 % LEL: 1.0 %

IONIZATION POTENTIAL (eV): 8.76

VAPOR DENSITY: 3.7 air=1

SPECIFIC GRAVITY: 0.867 20C

DENSITY: 0.866 g/mL @ 20 C

WATER SOLUBILITY: 0.015%

INCOMPATIBILITIES: STRONG OXIDIZERS

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: OXIDIZING MATERIALS Source: SAX

STABILITY DURING TRANSPORT: No Data

NEUTRALIZING AGENTS: No data

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: None reported other than possible unburned vapors

ODOR DETECTED AT (ppm): 140

ODOR DESCRIPTION: AROMATIC Source: CHRIS

100 % ODOR DETECTION: No data

DOT HAZARD CLASS: Flammable liquid

DOT GUIDE: 26

DOT ID NUMBER: UN1175

DOT SHIPPING NAME: ETHYLBENZENE

STCC NUMBER: 4909163

EPA WASTE NUMBER:

CERCLA REF: Y

RQ DESIGNATION: C 1000 pounds (454 kg)

SARA TPQ VALUE: Not listed

CLEAN AIR ACT: N

NFPA CODES:

HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.

FLAMMABILITY (RED) : (3) This material can be ignited under almost all temperature conditions.

REACTIVITY (YELLOW): (0) Stable even under fire conditions.

SPECIAL : Unspecified

TARGET ORGANS: EYES, UPPER RESP SYS, SKIN, CNS

SYMPTOMS : INHALATION MAY CAUSE IRRITATION OF NOSE, DIZZINESS, DEPRESSION. MODERATE IRRITATION OF EYE WITH CORNEAL INJURY POSSIBLE. IRRITATES SKIN AND MAY CAUSE BLISTERS, SUBSTERNAL TIGHTNESS, NARCOSIS. Source: THIC

CONC IDLH: 2000 PPM

PERMISSIBLE EXPOSURE (OSHA): 100 ppm SKIN
CARCINOGEN?: N STATUS:
REFERENCES:

3 4 00190
CARCINOGEN LISTS:
IARC: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH:Not listed.
HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
ihl-hmn TCLo:100 ppm/8H AIHAAP 31,206,70 SENSE ORGANS Eye
Other BEHAVIORAL Sleep LUNGS, THORAX, OR RESPIRATION
Other changes

LD50 (mg/kg): 3500 SPECIES: ORAL RAT

PROTECTION SUGGESTED:
CHRIS MANUAL:
SELF-CONTAINED BREATHING APPARATUS; SAFETY GOGGLES.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes contaminated.

** REMOVE CLOTHING:
Immediately remove any clothing that becomes wet to avoid any flammat

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (95-114)
OSHA (ETHYL BENZENE)
1000 ppm: Any powered air-purifying respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any supplied-air respirator. * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. * Substance reported to cause eye irritation or damage may require eye protection. / Any chemical cartridge respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection.
2000 ppm: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any supplied-air respirator with a full facepiece. / Any self-contained breathing apparatus with a full facepiece.
EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.
FIRST AID (NIOSH):

EYE:
PROMPTLY FLUSH WITH PLENTY OF WATER FOR 15 MIN. AND GET MEDICAL ATTENTION.
SKIN:
PROMPTLY FLUSH WITH PLENTY OF WATER AND GET MEDICAL ATTENTION. REMOVE AND WASH CONTAMINATED CLOTHING.
INHALATION:
IF ILL EFFECTS OCCUR, REMOVE VICTIM TO FRESH AIR, KEEP WARM & QUIET, & GET MEDICAL HELP PROMPTLY; IF BREATHING STOPS, GIVE ARTIFICIAL RESPIRATION.
INGESTION:
INDUCE VOMITING ONLY UPON PHYSICIAN'S APPROVAL; MATERIAL IN LUNG MAY CAUSE CHEMICAL PENUMONITIS.

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.3
DOT SHIPPING NAME: ETHYLBENZENE
DOT ID NUMBER: UN1175

POTENTIAL HAZARDS DOT GUIDE NUMBER 26

*FIRE OR EXPLOSION
Will burn. May be ignited by heat, sparks and flames.
Flammable vapor may spread away from spill.
Container may explode in heat of fire.
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.

*HEALTH HAZARDS
Vapors may cause dizziness or suffocation.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away.
Stay upwind; keep out of low areas.
Isolate hazard area and deny entry.
Wear self-contained breathing apparatus and full protective clothing.
Isolate for 1/2 mile in all directions if tank or tankcar is involved fire.
FOR EMERGENCY ASSISTANCE CALL CHEMTREC (800) 424-9300.
Also, in case of water pollution, call local authorities.

*FIRE
Small Fires: Dry chemical, CO2, water spray or alcohol foam.
Large Fires: Water spray, fog or alcohol foam.
Move container from fire area if you can do it without risk.
Stay away from ends of tanks.
Cool containers that are exposed to flames with water from the side until well after fire is out.
For massive fire in cargo area, use unmanned hose holder or monitor nozzles.
Withdraw immediately in case of rising sound from venting safety device or discoloration of tank.

*SPILL OR LEAK
No flares, smoking or flames in hazard area.
Stop leak if you can do it without risk.
Use water spray to reduce vapors.
Small Spills: Take up with sand, or other noncombustible absorbent material, then flush area with water.

Large Soills: Dike far ahead of soill for later disposal.

*FIRST AID

Move victim to fresh air; call emergency medical care.
If not breathing, give artificial resoiration.
If breathing is difficult, give oxygen.
In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes.
Remove and isolate contaminated clothing and shoes.

CHEMTOX DATA

CHEMTOX RECORD 106 3 4 00193 LAST UPDATE OF THIS RECORD: 12/26/8

NAME: CHLOROFORM

SYNONYMS: CHLORUFORM (DOT); CHLOROFORME (French); CLOROFORMIO (Italian); FORMYL TRICHLORIDE; FREON 20; METHANE TRICHLORIDE; METHANE, TRICHLORO-; METHENYL TRICHLORIDE; METHYL TRICHLORIDE; NCI-C02686; R 20; R 20 (REFRIGERANT); TCM; TRICHLOORMETHAAN (Dutch); TRICHLORMETHAN (Czech); TRICHLOROFORM; TRICHLOROMETHANE; TRICLOROMETANO (Italian)

CAS: 67-66-3 RTECS: FS9100000

FORMULA: CHCl3 MOL WT: 119.38

CHEMICAL CLASS: CHLORINATED HC

PHYSICAL DESCRIPTION: A CLEAR, COLORLESS MOBILE LIQUID WITH A CHARACTERISTIC ODOR

BOILING POINT: 333.65 K 60.5 C 140.9 F

MELTING POINT: 210.15 K -63 C -81.4 F

FLASH POINT: NOT K COMBNOT COMBUSNOT COMBUSTIBLE

VAPOR PRESSURE: 160 MM

AUTO IGNITION:

UEL: NA LEL: NA

IONIZATION POTENTIAL (eV): 11.42

VAPOR DENSITY: 4.1 air=1

SPECIFIC GRAVITY: 1.49 20C

DENSITY: 1.49 g/cc or 13.857 lb/gal

WATER SOLUBILITY: 0.8%

INCOMPATIBILITIES: STRONG CAUSTICS, CHEMICALLY ACTIVE METALS. SUCH AS ALUMINUM, MAGNESIUM POWDER, SODIUM, POTASSIUM

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: DECOMPOSES SLOWLY IN SUNLIGHT, REACTION MAY BE ACCELERATED BY IRON AND WATER AT HIGH TEMPERATURES
Source: THIC

STABILITY DURING TRANSPORT: No Data

NEUTRALIZING AGENTS: No data

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: HCL,PHOSGENE]CORR TO RESP SYSTEM]SCBA

ODOR DETECTED AT (ppm): 205-307

ODOR DESCRIPTION: PLEASANT, SWEET; ETHEREAL Source: CHRIS

100 % ODOR DETECTION: No data

DOT HAZARD CLASS: CRM-A

DOT GUIDE: 55

DOT ID NUMBER: UN1888

DOT SHIPPING NAME: CHLOROFORM

STCC NUMBER: 4940310,4940311

EPA WASTE NUMBER: U044

CERCLA REF: Y

RQ DESIGNATION: D 5000 pounds (2270 kg)

SARA TPQ VALUE: 10000 pounds

CLEAN AIR ACT: N

NFPA CODES:

HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.

FLAMMABILITY (RED) : (0) This material does not readily burn.

REACTIVITY (YELLOW): (0) Stable even under fire conditions.

SPECIAL : Unspecified

TARGET ORGANS: LIVER, KIDNEYS, HEART, EYES, SKIN, CNS
SYMPTOMS : HEADACHE, NAUSEA, DIZZINESS, DRUNKENESS, NARCOSIS. ANOREXIA, DIURESIS. Source: THIC
CONC IDLH: 1000 ppm
PERMISSIBLE EXPOSURE (OSHA): 50 ppm CEILING VALUE
CARCINOGEN?: Y STATUS: ANIMAL POSITIVE
REFERENCES:
ANIMAL POSITIVE IARC** 20,401,79
HUMAN SUSPECTED IARC** 20,401,79
ANIMAL SUSPECTED IARC** 1,61,72

CARCINOGEN LISTS:

IARC: Carcinogen defined by IRAC to be probably carcinogenic to humans, but having (usually) no human evidence.
NIOSH: Carcinogen defined by NIOSH with no further categorization.
NTP: Carcinogen defined by NTP as reasonable anticipated to be carcinogenic, with limited evidence in humans or sufficient evidence in experimental animals.
ACGIH: Carcinogen defined by ACGIH TLV Committee as a suspected carcinogen, based on either limited epidemologic evidence or demonstration of carcinogenicity in experimental animals.

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
orl-hmn LDLo:140 mg/kg 32ZWAA 8,275,74

ihl-hmn TCLo:1000 mg/m3/1Y IRGGAJ 24,127,67 BEHAVIORAL Anorexia(human) GASTROINTESTINAL Nausea or vomiting GASTROINTESTINAL Other changes

ihl-hmn TCLo:5000 mg/m3/7M AHBAAM 116,131,36 BEHAVIORAL Hallucinations, distorted perceptions

LD50 (mg/kg): 800 SPECIES: ORAL-RAT

PROTECTION SUGGESTED:
CHRIS MANUAL:
CHEMICAL GOGGLES, 50 PPM TO 2%: SUITABLE FULL-FACE MASK. ABOVE 2%: SUITABLE SELF-CONTAINED SYSTEM.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Reasonable probability of skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes wet.

** REMOVE CLOTHING:
Promptly remove non-impervious clothing that becomes contaminated.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)

NIOSH (CHLOROFORM)
Greater at any detectable concentration. : Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.
FIRST AID (NIOSH):
EYE:
FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES AND GET MEDICAL ATTENTION.
SKIN:
WASH WITH SOAP AND WATER, REMOVE CONTAMINATED CLOTHING AND FREE OF CHEMICAL.
INHALATION:
IF ILL EFFECTS DEVELOP, GET VICTIM TO FRESH AIR, KEEP HIM WARM & QUIET; GET MEDICAL ATTENTION. IF BREATHING STOPS, START ARTIFICIAL RESPIRATION.
INGESTION:
INDUCE VOMITING & GET MEDICAL ATTENTION. NO KNOWN ANTIDOTE; TREAT SYMPTOMS.

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.3
DOT SHIPPING NAME: CHLOROFORM
DOT ID NUMBER: UN1888

POTENTIAL HAZARDS DOT GUIDE NUMBER 55

HEALTH HAZARDS
Poison.
May be fatal if inhaled, swallowed or absorbed through skin.
Contact may cause burns to skin and eyes.
Runoff from fire control or diltuion water may cause pollution.

*FIRE OR EXPLOSION
Some of these materials may burn but do not ignite readily.
Cylinder may explode in heat of fire.

EMERGENCY ACTION

Keep unnecessary people away.
Stay upwind; keep out of low areas.
Isolate hazard area and deny entry.
Wear positive pressure breathing apparatus and full protective clothing.
FOR EMERGENCY ASSISTANCE CALL CHEMTREC (800) 424-9300.
Also, in case of water pollution, call local authorities.

*FIRE
Small Fires: Dry chemical, CO2, water spray or foam.
Large Fires: Water spray, fog or foam.
Move container from fire area if you can do it without risk.
Fight fire from maximum distance.

SPILL OR LEAK
Do not touch spilled material.
Stop leak if you can do it without risk.
Use water spray to reduce vapors.
Small Spills: Take up with sand, or other noncombustible absorbent material, then flush area with water.
Small Dry Spills: Shovel into dry containers and cover; move containers:

then flush area with water.
Large Soills: Dike far ahead of soill for later disoosal.

*FIRST AID

Move victim to fresh air; call emergency medical care.
If not breathing, give aritficial resbiration.
If breathing is difficult, give oxygen.
In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes.
Soeed in removing material from skin is of extreme imoortance.
Remove and isolate contaminated clothing and shoes.
Keep victim quiet and maintain normal body temoerature.
Effects may be delayed, keeo victim under observation.

CHEMTOX DATA

CHEMTOX RECORD 405 LAST UPDATE OF THIS RECORD: 09/19/86

NAME: 1,1,1-TRICHLOROETHANE

SYNONYMS: AEROTHENE TT; CHLOROETENE; CHLOROETHENE; CHLOROETHENE NU; CHLOROFORM, METHYL-; CHLOROTHANE NU; CHLOROTHENE; CHLOROTHENE(Inhibited); CHLOROTHENE NU; CHLOROTHENE VG; CHLORTEN; INHIBISOL; METHYLCHLOROFORM; METHYL CHLOROFORM (DOT); METHYLTRICHLOROMETHANE; NCI-C04626; SOLVENT 111; alpha-T; 1,1,1-TRICHLOORETHAAN (Dutch); 1,1,1-TRICHLORAETHAN (German); TRICHLORO-1,1,1-ETHANE (French); alpha-TRICHLOROETHANE; 1,1,1-TRICHLOROETHANE; 1,1,1-TRICLOROETANO (Italian); ETHANE, 1,1,1-TRICHLORO-; 1,1,1-TRICHLOROETHANE, STABILIZED

CAS: 71-55-6 RTECS: KJ2975000

FORMULA: C2H3Cl3 MOL WT: 133.40

CHEMICAL CLASS: ALIPHATIC HC HALIDE

PHYSICAL DESCRIPTION: COLORLESS LIQUID WITH A MILD, CHLOROFORM-LIKE ODOR

BOILING POINT: 346.31 K 73.1 C 163.6 F

MELTING POINT: 235.76 K -37.4 C -35.4 F

FLASH POINT:

VAPOR PRESSURE: 100 MM

AUTO IGNITION:

UEL: 16 % LEL: 7 %

VAPOR DENSITY: air=1

SPECIFIC GRAVITY: 1.31

DENSITY: 1.31 g/cc or 12.183 lb/gal

WATER SOLUBILITY: 0.07 %

INCOMPATIBILITIES: STRONG CAUSTICS, STRONG OX, CHEMICALLY ACTIVE METALS LIKE ALUMINUM, MAGNESIUM, SODIUM, POTASSIUM

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: No data

STABILITY DURING TRANSPORT: No Data

NEUTRALIZING AGENTS: No data

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: HCL AND PHOSGENE\CORROSIVE

ODOR DETECTED AT (ppm):

ODOR DESCRIPTION: Source:

100 % ODOR DETECTION: No data

DOT HAZARD CLASS: ORM-A

DOT GUIDE: 55

DOT ID NUMBER: UN2831

DOT SHIPPING NAME: 1,1,1-TRICHLOROETHANE

STCC NUMBER:

EPA WASTE NUMBER: U226

CERCLA REF:

RQ DESIGNATION: C 1000 pounds (454 kg)

SARA TPQ VALUE: Not listed

CLEAN AIR ACT:

NFPA CODES:

HEALTH HAZARD (BLUE): (3) Extremely hazardous to health. Full protection required. No skin surface should be exposed.

FLAMMABILITY (RED) : (1) This material must be preheated before ignition can occur.

REACTIVITY (YELLOW): (1) Normally stable, but may become unstable at elevated temperature and pressures.

SPECIAL 4 00198 Unspecified

TARGET ORGANS: SKIN, CVS, CNS, EYES
SYMPTOMS : IRRIT NOSE, EYES, CNS DEPRESSION, LIVER, KIDNEY DAMAGE, PSYCHOTROPIC GASTROINTESTINAL AND CNS EFFECTS; SKIN, EYE IRRITANT; NARCOTIC IN HIGH CONCENTRATIONS. CAN CAUSE CARDIAC ARREST WHEN MASSIVELY INHALED. Source: SAX
CONC IDLH: 10000]
PERMISSIBLE EXPOSURE (OSHA): 350 ppm
CARCINOGEN?: Y-POSTATUS: ANIMAL INDEFINITE
REFERENCES:
ANIMAL INDEFINITE IARC** 20,515,79

CARCINOGEN LISTS:
IARC: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH:Not listed.
HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
ihl-man LCLo:27 gm/m3/10M JOCMA7 8,358,66

ihl-man TCLo:350 ppm WEHSAL 10,82,73 BEHAVIORAL Hallucinations, distorted perceptions BEHAVIORAL Changes in motor activity(specific assay) BEHAVIORAL Change in psycophysiological tests

orl-hmn TDLo:670 mg/kg NTIS GASTROINTESTINAL Hypermotility,diarrhea GASTROINTESTINAL Nausea or vomiting GASTROINTESTINAL Other changes

LD50 (mg/kg): 10300 SPECIES: oral-rat

PROTECTION SUGGESTED:
CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes contaminated.

** REMOVE CLOTHING:
Promptly remove non-impervious clothing that becomes wet.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
NIOSH (1,1,1-TRICHLOROETHANE)
2000 ppm: Any supplied-air respirator. * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. * Substance reported to cause eye irritation or damage may require eye protection.

EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.
FIRST AID (NIOSH):
EYE:
IRR IMMED
SKIN:
SOAP WASH PROMPTLY
INHALATION:
ART RESP
INGESTION:
IPECAC, VOMIT

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.3
DOT SHIPPING NAME: 1,1,1-TRICHLOROETHANE
DOT ID NUMBER: UN2831

POTENTIAL HAZARDS DOT GUIDE NUMBER 55

*HEALTH HAZARDS
Poison.
May be fatal if inhaled, swallowed or absorbed through skin.
Contact may cause burns to skin and eyes.
Runoff from fire control or dilution water may cause pollution.

*FIRE OR EXPLOSION
Some of these materials may burn but do not ignite readily.
Cylinder may explode in heat of fire.

EMERGENCY ACTION

Keep unnecessary people away.
Stay upwind; keep out of low areas.
Isolate hazard area and deny entry.
Wear positive pressure breathing apparatus and full protective clothing.
FOR EMERGENCY ASSISTANCE CALL CHEMTREC (800) 424-9300.
Also, in case of water pollution, call local authorities.

*FIRE
Small Fires: Dry chemical, CO2, water spray or foam.
Large Fires: Water spray, fog or foam.
Move container from fire area if you can do it without risk.
Fight fire from maximum distance.

*SPILL OR LEAK
Do not touch spilled material.
Stop leak if you can do it without risk.
Use water spray to reduce vapors.
Small Spills: Take up with sand, or other noncombustible absorbent material, then flush area with water.
Small Dry Spills: Shovel into dry containers and cover; move containers; then flush area with water.
Large Spills: Dike far ahead of spill for later disposal.

*FIRST AID

Move victim to fresh air; call emergency medical care.
If not breatning, give aritficial respiration.
If breathing is difficult, give oxygen.
In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes.
Speed in removing material from skin is of extreme importance.
Remove and isolate contaminated clothing and shoes.
Keep victim quiet and maintain normal body temperature.
Effects may be delayed, keep victim under observation.

CHEMTOX DATA

CHEMTOX RECORD 1655 LAST UPDATE OF THIS RECORD: 12/26/86

NAME: METHYLENE CHLORIDE

SYNONYMS: AEROTHENE MM; CHLORURE DE METHYLENE (French); DCM; DICHLOROMETHANE; DICHLOROMETHANE (DOT); FREON 30; METHANE DICHLORIDE; METHYLENE BICHLORIDE; METHYLENE CHLORIDE; METHYLENE CHLORIDE (DOT); METHYLENE DICHLORIDE; METYLENU CHLOREK (Polish); NARKOTIL; NCI-C50102; SOLAESTHIN; SOLMETHINE

CAS: 75-09-2 RTECS: PA8050000

FORMULA: CH_2Cl_2 MOL WT: 84.93

CHEMICAL CLASS: ALIPHATIC HC HALIDE

PHYSICAL DESCRIPTION: COLORLESS LIQUID WITH A CHLOROFORM-LIKE ODOR

BOILING POINT: 313.15 K 40 C 104 F

MELTING POINT: 176.49 K -96.7 C -142 F

FLASH POINT: NONE K NONE NONE

VAPOR PRESSURE: 440mm @ 25 C

AUTO IGNITION: 913 K 639.8 C 1183.7 F

UEL: 19 % LEL: 12 %

IONIZATION POTENTIAL (eV): 11.35

VAPOR DENSITY: 2.9 air=1

SPECIFIC GRAVITY:

DENSITY: 1.36174g/mL @ 0 C

WATER SOLUBILITY: 1.3%

INCOMPATIBILITIES: STRONG OXIDIZERS, STRONG CAUSTICS, CHEMICALLY ACTIVE METALS, SUCH AS ALUMINUM OR MAGNESIUM POWDERS; SODIUM, POTASSIUM. REACTS VIOLENTLY WITH LITHIUM, SODIUM POTASSIUM ALLOY, POTASSIUM-TERT-BUTOXIDE, (POTASSIUM HYDROXIDE+N-METHYL-N-NITROSOUREA) #SAX

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: No data

STABILITY DURING TRANSPORT: No Data

NEUTRALIZING AGENTS: No data

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: PHOSGENE/CORROSIVE. HIGHLY TOXIC AND IRRITATING FUMES #THIC. WHEN HEATED TO DECOMPOSE. EMITS HIGHLY TOXIC FUMES OF PHOSGENE #SAX.

ODOR DETECTED AT (ppm): 307

ODOR DESCRIPTION: LIKE CHLOROFORM, SWEET ETHERAL Source: C-RIS

100 % ODOR DETECTION: No data

DOT HAZARD CLASS: ORM-A

DOT GUIDE: 55

DOT ID NUMBER: UN1593

DOT SHIPPING NAME: METHYLENE CHLORIDE

STCC NUMBER:

EPA WASTE NUMBER: U080

CERCLA REF: Y

RQ DESIGNATION: C 1000 pounds (454 kg)

SARA TPQ VALUE: Not listed

CLEAN AIR ACT: N

EPA CODES:

HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.

FLAMMABILITY (RED) : (1) This material must be preheated before ignition can occur.

REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

TARGET ORGANS: SKIN, CVS, EYES, CNS
SYMPTOMS : INHALATION: ANESTHETIC EFFECTS, NAUSEA AND DRUNKENNESS. CONTACT WITH SKIN AND EYES: SKIN IRRITATION, IRRITATION OF EYES AND NOSE. NARCOTIC POWERS ARE QUITE STRONG; CAN CAUSE DERMATITIS UPON PROLONGED SKIN CONTACT; VERY DANGEROUS TO EYES. Source: SAX, CHRIS
CONC IDLH: 5000 PPM
PERMISSIBLE EXPOSURE (OSHA): 500 ppm AIR
CARCINOGEN?: Y-POSTATUS: ANIMAL INDEFINITE
REFERENCES:
ANIMAL INDEFINITE IARC** 20,449,79

CARCINOGEN LISTS:
IARC: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Carcinogen defined by ACGIH TLV Committee as a suspected carcinogen, based on either limited epidemologic evidence or demonstration of carcinogenicity in experimental animals.

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
inl-hmn TCLo:500 ppm/1Y-I ABHYAE 43,1123,68 BEHAVIORAL Altered sleep time(including change in righting reflex) BEHAVIORAL Somnolence(general depressed activity) CARDIAC Change in rate

LD50 (mg/kg): 167 SPECIES: orl-rat

PROTECTION SUGGESTED:
CHRIS MANUAL:
ORGANIC VAPOR CANISTER MASK, SAFETY GLASSES, PROTECTIVE CLOTHING.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes wet.

** REMOVE CLOTHING:
Promptly remove non-impervious clothing that becomes wet.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
NIOSH (METHYLENE CHLORIDE)
2500 ppm: Any supplied-air respirator. * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. * Substance reported to cause eye irritation or damage may require eye protection.
1875 ppm: Any supplied-air respirator operated in a continuous flow mode. * Substance reported to cause eye irritation or damage may require eye protection.
1750 ppm: Any self-contained breathing apparatus with a full facepiece.

/ Any supplied-air respirator with a full facepiece.
5000 ppm: Any supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive pressure mode.
EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.
FIRST AID (NIOSH):
EYE:
WASH. E3
SKIN:
REMOVE CONTAMINATED CLOTHING; WASH. S3
INHALATION:
REMOVE FROM EXPOSURE. GIVE OXYGEN IF NEEDED. B3
INGESTION:
NO SPECIFIC ANTIDOTE. M3

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.3
DOT SHIPPING NAME: METHYLENE CHLORIDE
DOT ID NUMBER: UN1593

POTENTIAL HAZARDS DOT GUIDE NUMBER 55

HEALTH HAZARDS
Poison.
May be fatal if inhaled, swallowed or absorbed through skin.
Contact may cause burns to skin and eyes.
Runoff from fire control or dilution water may cause pollution.

*FIRE OR EXPLOSION
Some of these materials may burn but do not ignite readily.
Cylinder may explode in heat of fire.

EMERGENCY ACTION

Keep unnecessary people away.
Stay upwind; keep out of low areas.
Isolate hazard area and deny entry.
Wear positive pressure breathing apparatus and full protective clothing.
FOR EMERGENCY ASSISTANCE CALL CHEMTREC (800) 424-9300.
Also, in case of water pollution, call local authorities.

*FIRE
Small Fires: Dry chemical, CO2, water spray or foam.
Large Fires: Water spray, fog or foam.
Move container from fire area if you can do it without risk.
Fight fire from maximum distance.

SPILL OR LEAK
Do not touch spilled material.
Stop leak if you can do it without risk.
Use water spray to reduce vapors.
Small Spills: Take up with sand, or other noncombustible absorbent material, then flush area with water.
Small Dry Spills: Shovel into dry containers and cover; move containers:

then flush area with water.
Large Spills: Dike far ahead of spill for later disposal.

FIRST AID
Move victim to fresh air; call emergency medical care.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.
In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes.
Speed in removing material from skin is of extreme importance.
Remove and isolate contaminated clothing and shoes.
Keep victim quiet and maintain normal body temperature.
Effects may be delayed, keep victim under observation.

CHEMTOX DATA

CHEMTOX RECORD 407 LAST UPDATE OF THIS RECORD: 12/26/86

NAME: TRICHLOROETHYLENE
SYNONYMS: TRICHLOROETHENE; ETHYLENE TRICHLORIDE; TRICLENE
CAS: 79-01-6 RTECS: KX4550000
FORMULA: C2HCl3 MOL WT: 131
CHEMICAL CLASS: CHLORINATED HC

PHYSICAL DESCRIPTION: COLORLESS WATERY LIQUID WITH A SWEET ODOR
BOILING POINT: 359.82 K 86.6 C 188 F
MELTING POINT: 187.04 K -86.2 C -123 F
FLASH POINT: NONE K NONE NONE
VAPOR PRESSURE: 58 MM
AUTO IGNITION: 683 K 409.8 C 769.7 F
UEL: 41 % LEL: 11 %
IONIZATION POTENTIAL (eV): 9.47
VAPOR DENSITY: 4.5 air=1
SPECIFIC GRAVITY: 1.46 20C
DENSITY: 1.46 g/cc or 13.578 lb/gal
WATER SOLUBILITY: 0.1%
INCOMPATIBILITIES: STRONG CAUSTICS; WHEN ACIDIC REACTS WITH ALUMINUM; CHEMICALLY ACTIVE METALS; BARIUM, LITHIUM, SODIUM, MAGNESIUM, TITANIUM
REACTIVITY WITH WATER: No data on water reactivity
REACTIVITY WITH COMMON MATERIALS: No data
STABILITY DURING TRANSPORT: No Data
NEUTRALIZING AGENTS: No data
POLYMERIZATION POSSIBILITIES: No data
TOXIC FIRE GASES: None reported other than possible unburned vapors
ODOR DETECTED AT (ppm): 50
ODOR DESCRIPTION: CHLOROFORM-LIKE; ETHEREAL Source: CHRIS
100 % ODOR DETECTION: No data

DOT HAZARD CLASS: ORM-A
DOT GUIDE: 55
DOT ID NUMBER: UN1710
DOT SHIPPING NAME: TRICHLOROETHYLENE
STCC NUMBER: 4941771

EPA WASTE NUMBER: U228
CERCLA REF:
RQ DESIGNATION: C 1000 pounds (454 kg)
SARA TPQ VALUE: Not listed
CLEAN AIR ACT:

NFPA CODES:
HEALTH HAZARD (BLUE): (3) Hazardous to health. Area may be entered with self-contained breathing apparatus.
FLAMMABILITY (RED) : (1) This material must be preheated before ignition can occur.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

TARGET ORGANS: EYES, SKIN, NOSE, THROAT, RESP. SYSTEM, HEART, LIVER, KIDNE
SYMPTOMS : HEAD, VERTIGO, VIS DIST, TREMORS, SOMNOLENCE, NAU, VOMIT, CARD ARRHY, PARESTHESIA, IRRIT EYES, DERM, BLURRED VISION, IRRITATION OF NOSE AND THROAT, NAUSIA, ATTITUDE OF IRRESPONSIBILITY, DISTURBANCE OF CENTRAL NERVOUS SYSTEM, LACHRYMATION, INHAL OF HIGH CONC

CAUSES NARCOSIS AND ANESTHESIA. Source: CHRIS,SAX

CONC IDLH:
PERMISSIBLE EXPOSURE (OSHA): 100 ppm
CARCINOGEN?: Y STATUS: ANIMAL POSITIVE
REFERENCES:
ANIMAL SUSPECTED IARC** 20,545,79
ANIMAL POSITIVE IARC** 11,263,76
HUMAN INDEFINITE IARC** 20,545,79

CARCINOGEN LISTS:
IARC: Not listed
NIOSH: Carcinogen defined by NIOSH with no further categorization.
NTP: Not listed
ACGIH:Not listed.

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
orl-hmn LDLo:7 gm/kg ARTODN 35,295,76

ihl-hmn TCLo:6900 mg/m3/10M AHBAAM 116,131,36 BEHAVIORAL Somnolence(general depressed activity) BEHAVIORAL Hallucinations, distorted perceptions

ihl-hmn TCLo:160 ppm/83M AIHAAP 23,167,62 BEHAVIORAL Hallucinations, distorted perceptions

ihl-hmn TDLo:812 mg/kg BMJOAE 2,689,45 BEHAVIORAL Somnolence(general depressed activity) GASTROINTESTINAL Other changes LIVER Jaundice,other or unclassified

ihl-man TCLo:110 ppm/8H BJIMAG 28,293,71 SENSE ORGANS Eye Other BEHAVIORAL Hallucinations, distorted perceptions

LD50 (mg/kg): 4920 SPECIES: oral-rat

PROTECTION SUGGESTED:
CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes wet.

** REMOVE CLOTHING:
Promptly remove non-impervious clothing that becomes wet.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
NIOSH (TRICHLOROETHYLENE)
Greater at any detectable concentration. : Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.
FIRST AID (NIOSH):
EYE:
IRR IMMED
SKIN:
SOAP WASH PROMPTLY
INHALATION:
ART RESP
INGESTION:
IPECAC, VOMIT

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.3
DOT SHIPPING NAME: TRICHLOROETHYLENE
DOT ID NUMBER: UN1710

POTENTIAL HAZARDS DOT GUIDE NUMBER 55

*HEALTH HAZARDS
Poison.
May be fatal if inhaled, swallowed or absorbed through skin.
Contact may cause burns to skin and eyes.
Runoff from fire control or dilution water may cause pollution.

*FIRE OR EXPLOSION
Some of these materials may burn but do not ignite readily.
Cylinder may explode in heat of fire.

EMERGENCY ACTION

Keep unnecessary people away.
Stay upwind; keep out of low areas.
Isolate hazard area and deny entry.
Wear positive pressure breathing apparatus and full protective clothing.
FOR EMERGENCY ASSISTANCE CALL CHEMTREC (800) 424-9300.
Also, in case of water pollution, call local authorities.

*FIRE
Small Fires: Dry chemical, CO2, water spray or foam.
Large Fires: Water spray, fog or foam.
Move container from fire area if you can do it without risk.
Fight fire from maximum distance.

*SPILL OR LEAK
Do not touch spilled material.
Stop leak if you can do it without risk.
Use water spray to reduce vapors.
Small Spills: Take up with sand, or other noncombustible absorbent material, then flush area with water.
Small Dry Spills: Shovel into dry containers and cover; move containers then flush area with water.
Large Spills: Dike far ahead of spill for later disposal.

FIRST AID
Move victim to fresh air; call emergency medical care.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.
In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes.
Speed in removing material from skin is of extreme importance.

Remove and isolate contaminated clothing and shoes.
Keep victim quiet and maintain normal body temperature.
Effects may be delayed, keep victim under observation.

CHEMTOX DATA

CHEMTOX RECORD 101 LAST UPDATE OF THIS RECORD: 02/18/

NAME: CHLOROBENZENE

SYNONYMS: MONOCHLOROBENZENE; CHLOROBENZOL; PHENYL CHLORIDE; MCB; BENZENE, CHLORO-; BENZENE CHLORIDE; PHENYLCHLORIDE; CHLOORBENZEEN (DUTCH); CHLORBENZEN; CHLOROBENZOL; CHLOROBENZEN (POLISH); MONOCHLOORBENZEEN (DUTCH); MONOCHLORBENZENE; MONOCHLORBENZOL (GERMAN); NCI-C54886

CAS: 108-90-7 RTECS: CZ0175000

FORMULA: C6H5Cl MOL WT: 112.56

CHEMICAL CLASS: CHLORINATED AROMATIC

PHYSICAL DESCRIPTION: COLORLESS, WATERY LIQUID WITH A SWEET, ALMOND ODOR.

BOILING POINT: 405.0 K 131.8 C 269.3 F

MELTING POINT: 227.4 K -45.8 C -50.4 F

FLASH POINT: 302 K 28.8 C 83.9 F

VAPOR PRESSURE: .0156

AUTO IGNITION: 913 K 639.8 C 1183.7 F

UEL: 9.6 % LEL: 1.3 %

IONIZATION POTENTIAL (eV): 9.07

VAPOR DENSITY: air=1

SPECIFIC GRAVITY: 1.11 20C

DENSITY: 1.11 g/cc or 10.323 lb/gal

WATER SOLUBILITY: 0.1%

INCOMPATIBILITIES: STRONG OXIDIZERS

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: No data

STABILITY DURING TRANSPORT: No Data

NEUTRALIZING AGENTS: No data

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: None reported other than possible unburned vapors

ODOR DETECTED AT (ppm): 0.21

ODOR DESCRIPTION: MILD AMINE ODOR; SWEET, ALMOND-LIKE; AROMATIC. Source

100 % ODOR DETECTION: No data

DOT HAZARD CLASS: Flammable liquid

DOT GUIDE: 27

DOT ID NUMBER: UN1134

DOT SHIPPING NAME: CHLOROBENZENE

STCC NUMBER: 4909153

EPA WASTE NUMBER: U037

CERCLA REF: Y

RQ DESIGNATION: B 100 pounds (45.4 kg)

SARA TPQ VALUE: Not listed

CLEAN AIR ACT: N

NFPA CODES:

HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.

FLAMMABILITY (RED) : (3) This material can be ignited under almost all temperature conditions.

REACTIVITY (YELLOW): (0) Stable even under fire conditions.

SPECIAL : Unspecified

TARGET ORGANS: RESP SYS, EYES, SKIN, CNS, LIVER

SYMPTOMS : IRRITATING TO SKIN, EYES, MUCOUS MEMBRANES. REPEATED EXPOSURE OF SKIN MAY CAUSE DERMITITIS DUE TO DEFATTING ACTION. CHRONIC INHALATION OF VAPORS OR MIST MAY

3 4 00210 RESULT IN DAMAGE TO LUNGS, LIVER, KIDNEYS. ACUTE VAPOR EXPOSURES CAN CAUSE SYMPTOMS RANGING FROM COUGHING TO TRANSIENT ANESTHESIA AND CENTRAL NERVOUS SYSTEM DEPRESSION, SOMNOLENCE, LOSS OF CONSCIOUSNESS, TWITCHING OF EXTREMITIES, CYANOSIS, RAPID RESPIRATION AND WEAK, IRREGULAR PULSE. IRRITATION TO EYES, NOSE AND THROAT. Source: CSDS,CHRIS

CONC IDLH: 2400 PPM
PERMISSIBLE EXPOSURE (OSHA): 75 ppm
CARCINOGEN?: STATUS:
REFERENCES:

CARCINOGEN LISTS:
IARC: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH:Not listed.

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

LD50 (mg/kg): 2910 SPECIES: ORAL RAT

PROTECTION SUGGESTED:
CHRIS MANUAL:
ORGANIC VAPOR-ACID GAS RESPIRATOR WHERE APPROPRIATE; NEOPRENE OR VINYL GLOVES; CHEMICAL SAFETY SPECTACLES, PLUS FACE-SHIELD WHERE APPROPRIATE; RUBBER FOOTWEAR; APRON OR IMPERVIOUS CLOTHING FOR SPLASH PROTECTION; HARD HAT.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Immediately when skin becomes wet.

** REMOVE CLOTHING:
Immediately remove any clothing that becomes wet to avoid any flammabilit

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
OSHA (CHLOROBENZENE)
1000 ppm: Any powered air-purifying respirator with organic vapor cartridge(s). * Substance causes eye irritation or damage; eye protection needed. / Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).
1875 ppm: Any supplied-air respirator operated in a continuous flow mode. * Substance causes eye irritation or damage; eye protection needed.
4000 ppm: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece.
EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other

positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.
FIRST AID (NIOSH):
EYE:
FLUSH THOROUGHLY WITH WATER.
SKIN:
REMOVE CONTAMINATED CLOTHING, WASH EXPOSED AREA WITH SOAP AND WATER.
INHALATION:
REMOVE TO CLEAN AIR: ADMINISTER OXYGEN AS NEEDED.
INGESTION:
DILUTE BY DRINKING WATER; IF VOMITING OCCURS, ADMINISTER MORE WATER.
ADMINISTER SALINE LAXATIVE.

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.3
DOT SHIPPING NAME: CHLOROBENZENE
DOT ID NUMBER: UN1134

POTENTIAL HAZARDS DOT GUIDE NUMBER 27

*FIRE OR EXPLOSION
Will burn. May be ignited by heat, sparks and flames.
Flammable vapor may spread away from spill.
Container may explode in heat of fire.
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.

*HEALTH HAZARDS
Vapors may cause dizziness or suffocation.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away.
Stay upwind; keep out of low areas.
Isolate hazard area and deny entry.
Wear self-contained breathing apparatus and full protective clothing.
Isolate for 1/2 mile in all directions if tank or tankcar is involved in fire.
FOR EMERGENCY ASSISTANCE CALL CHEMTREC (800) 424-9300.
Also, in case of water pollution, call local authorities.

*FIRE
Small Fires: Dry chemical, CO2, water spray or foam.
Large Fires: Water spray, fog or foam.
Move container from fire area if you can do it without risk.
Stay away from ends of tanks.
Cool containers that are exposed to flames with water from the side until well after fire is out.
For massive fire in cargo area, use unmanned hose holder or monitor nozzles.
If this is impossible, withdraw from area and let fire burn.
Withdraw immediately in case of rising sound from venting safety device or discoloration of tank.

*SPILL OR LEAK

No flares, smoking or flames in hazard area.
Stop leak if you can do it without risk.
Use water spray to reduce vapors.
Small Spills: Take up with sand, or other noncombustible absorbent material, then flush area with water.
Large Spills: Dike far ahead of spill for later disposal.

*FIRST AID

Move victim to fresh air; call emergency medical care.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.
In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes.
Remove and isolate contaminated clothing and shoes.